AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF PAGES
J	1	2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0002	16 August 2002		

6. ISSUED BY CODE

U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE
CORPS OF ENGINEERS
4101 JEFFERSON PLAZA, N.E.
ALBUQUERQUE, NEW MEXICO 87109-3435

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CODE FACILITY CODE

(√)	
X	9A. AMENDMENT OF SOLICITATION NO. DACA47-02-R-0023
	9B. DATED *(SEE ITEM 11)* July 2002
	10A. MODIFICATION OF CONTRACTS/ORDER NO.
	10B. DATED *(SEE ITEM 13)*

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☒ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

PROJECT: DESIGN/BUILD, UPGRADE SMALL ARMS FIRING RANGE, KIRTLAND AIR FORCE BASE, NEW MEXICO

1. This is Amendment No. 2 to Solicitation No. DACA47-02-R-0023; July 2002. The following revisions shall be incorporated into the specifications and drawings. All other provisions shall remain unchanged.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR _____ *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ *(Signature of Contracting Officer)*	16C. DATE SIGNED

2. SOLICITATION, OFFER, AND AWARD, Standard Form 1442: In Block 13A, change the date for receipt of proposals from "8/22/02" to "8/27/02".

3. SPECIFICATIONS: Delete the following listed pages and substitute the pages attached hereto. On the revised pages, for convenience, changes are emphasized by the amendment number in parentheses before and after changes from the previous issue. All portions of the revised (or new) pages shall apply whether or not changes have been indicated.

Delete Page	Insert Page
Volume 1 of 3	
Proposal Schedule, Page 3	Proposal Schedule, Page 3
Section 00110, Page 20 and 21 of 159	Section 00110, Page 20 and 21 of 159
01010-1	01010-1
01010-3 thru 01010-7	01010-3 thru 01010-7
01010-9	01010-9
01010-11	01010-11
01010-13	01010-13
01010-19	01010-19
01010-40 thru 01010-41	01010-40 thru 01010-41
01010-44	01010-44
Volume 3 of 3	
Appendix Index	Appendix Index
Appendix G, 13280-7	Appendix G, 13280-7
Appendix G, 13280-20	Appendix G, 13280-20
Appendix G, 13280-25	Appendix G, 13280-25
Appendix G, 13280-27	Appendix G, 13280-27
Appendix G, 13280-31	Appendix G, 13280-31
Appendix G, 13280-35	Appendix G, 13280-35
---	Appendix O (New Appendix)
---	Appendix P (New Appendix)

3. DRAWING CHANGES: The following drawings have been revised and the sequence number changed to indicate such revision: 2.1 and new drawing 3.

5. DRAWINGS PROVIDED FOR INFORMATION ONLY: G-1, G-4 and Topography Map.

////////LAST ITEM////////

PROPOSAL SCHEDULE
(To be attached to SF 1442)

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
BASE BID					
0001	Total Cost for Design of Upgrade Small Arms Firing Range and All Site Improvements, Complete	Job	Sum	***	$_____
0002	Total Cost for Demolition of Buildings 707 and 709, Complete	Job	Sum	***	$_____
0003	Total Cost for Asbestos Removal and Disposal, Complete	Job	Sum	***	$_____
0004	Total Cost for Lead-Contaminated Materials Removal and Disposal, Complete	Job	Sum	***	$_____
0005	Total Cost for Construction of Upgrade Small Arms Range Inside the Building 5'-0" Line, Complete	Job	Sum	***	$_____
0006	Total Cost for Construction of All Site Improvements, Including Demolition (Outside the Building 5'-0" Line), Including Grading, Paving, Utilities, Parking, Curb and Gutters, Sidewalks, Fiber Optic, Exterior Lighting, and Eighteen (18) Fully-Baffled Firing Positions, Complete	Job	Sum	***	$_____

(2) (2)

Written portions shall be in 8-1/2" x 11" format using no more than 7 vertical lines per inch and each page shall have a page number on the bottom, starting with the first page to the last. The binder used for this volume should be approximately 1" larger than necessary to facilitate our addition of Owner/Client Past Performance Surveys that we will be receiving directly from your previous customers.

3.2 You are cautioned to refrain from quoting prices, or other pricing terms of any nature, in this technical portion of your proposal. Additionally, do not alter the format of the forms required for Factors 1 and 2.

3.3 **Factor 1: Experience (Tab A).** Relevant experience shall be submitted using the Project Experience Form provided at the end of this Section. The form should be reproduced for each project submitted. Provide up to five (5) examples of projects within the recent past that are similar to this project in scope and magnitude. If a project is currently under construction, annotate percentage of completion on the form. Information provided on the project experience forms will be evaluated for this Factor 1, and will also be used to support the evaluation of Factor 2, Past Performance (Tab B). Offerors are invited, but not required, to submit photographs of the projects in conjunction with this Tab.

3.4 **Factor 2: Past Performance (Tab B).**

3.4.1 Owner/Client Past Performance Surveys. For each project submitted under Factor 1 – Experience (Tab A), provide to your previous customers a completed copy of the respective Project Experience Form along with a blank Owner/Client Past Performance Survey, which is provided at the end of this Section. **Customers** shall return both forms directly to the Albuquerque District Contracting Division at the address specified on the Owner/Client Past Performance Survey. Surveys should be received by the Contracting Division no later than the proposal due date.

3.4.2 Small Business Subcontracting Success. This information will be obtained from the Project Experience Forms submitted for the offeror for Factor 1 (Tab A) and from any other information the offeror chooses to submit, which evidences small-business subcontracting efforts. If you do not have specific documentation in this area, narratively state your commitment, if any, on previous projects, to subcontracting to various types of small-business concerns.

3.4.3 Safety Experience Record. The Offeror shall provide documentation of the firm's safety performance record in the form of the Experience Modification Rate (EMR) for the last five years.

3.5 **Factor 3: Proposed Schedule (Tab C).**

3.5.1 Narrative. Provide a narrative describing your scheduling capability and planning organization. Address how you maintain, update, and use your schedule. Describe the software you intend to use, understanding that the software must support the Corps of Engineers Data Exchange format. **Provide a statement that clearly indicates the total proposed project duration in calendar days and acknowledge that this total proposed contract duration will become contractually binding should you receive the award.**

3.5.2 Schedule. In graphic format, submit a proposed schedule in **calendar days** for the construction of this project. The schedule may on 11" x 17' paper, folded to fit within the binder. This schedule shall clearly demonstrate an understanding of the appropriate sequence of design and construction for this project. The schedule shall be task oriented, indicating the number of calendar days, after notice to proceed, by which major milestones are to be achieved, including key phases of demolition, design and construction, completion date of the project, and beneficial occupancy date. Assume an NTP date of October 15, 2002. Upon award, the proposed schedule shall be used as the basis for development of the initial NAS (Network Analysis System).

3.6 **Factor 4: Technical Approach (Tab D).** Based on your understanding of the design requirements in Section 01010, describe the technical approach you will take to address the unique challenges, opportunities, and constraints inherent to this project. Specifically address your approach in designing and constructing a fully baffled range. (2) State why your firm is especially qualified to undertake this project. Specifically address your approach to hazardous waste investigations for potential chemical and metal contaminants. Specifically address your approach to decontamination/demolition of building materials containing potentially hazardous constituents such as lead based paint, asbestos and lead dust. (2)

3.7 **Factor 5: Management Plan (Tab E).**

3.7.1 Key Personnel. Use the Personnel Resume Form provided at the end of this Section to provide qualifications for the key personnel who will be dedicated to this project. Lines may be added to the Personnel Resume Form as required. (See Section 00800, Special Contract Requirements, for information on substitution of key personnel after award.) Complete Personnel Resume Forms for the following individuals only: Construction (2) Project Manager, Construction Site Superintendent, Contractor Quality Control Manager and Environmental Consultant Certified Industrial Hygienist. Resumes for other personnel will not be evaluated. (2)

3.7.2 Organization Chart/Narrative. Provide an organization chart showing lines of authority for the key construction personnel for this project. By narrative, **briefly** describe the organization, responsibilities, lines of authority, and quality control and safety procedures established to complete the design and construction of this project. Describe how the onsite Design/Build management team organization will interact during design and construction. Describe your resources available to support this project concurrently with other projected or ongoing work.

SECTION 01010

DESIGN REQUIREMENTS

1. **PROJECT DESCRIPTION**.

1.1 **General.** This request for proposal (RFP) provides for the design and construction of the Upgrade Small Arms Firing Range and Support Facility.

1.2 **Location.** The Upgrade Small Arms Firing Range and Support Facility site is located on the south side of Southgate Avenue approximately 250 meters (820 ft) southwest of Old Tower Road.

(2) 1.3 The project includes the construction of a 25 meter (82.02 ft.) fully baffled rigid pavement firng range and twenty-eight 1.2 M (5 ft.) wide covered firng positions, bullet traps, target retrieval system and a sound-proof control booth with HVAC and telephone, demolition of two buildings, construction of a new Combat Arms Training and Maintenance building that includes classrooms, administrative offices, weapons maintenance areas, space for the cleaning and degreasing of weapons, an alarmed weapons and munitions storage room, sanitary facilities, a student weapons cleaning room, and miscellaneous storage. Ammunition used on this range is to be 5.56 mm ball, M855; tracer M856. The project also includes grading, utilities, access drive ways, a rigid pavement parking area, sidewalks, curb and gutter, lighting, dumpster and mechanical pads and landscaping. Utilities include fire demand and domestic water lines, gas line, sanitary and storm sewer lines, communication lines, fire hydrants, and all associated appurtenances. (2)

2. **DESIGN SUBMITTAL REQUIREMENTS**. See Section 01012, DESIGN AFTER AWARD.

2.1 **Standards, Documents, and Criteria.** The design requirements within Section 01010 represent the minimum quality and quantity acceptable for the proposals and project submittals. The standards, documents, and criteria referenced within this RFP, although not all attached within this RFP document, are modified to the extent indicated within this section, and shall be the most current version. Each Offeror shall be responsible for obtaining any documents not attached as part of this RFP but referenced as criteria for the project. Requirements of this section may delete, revise, add to, or substitute for criteria contained in the referenced documents and this section shall be deemed the controlling authority of any changes to the other referenced documents and criteria.

2.2 **Design Standards.** Equipment, hardware, and materials shall be standard manufactured items unless otherwise specified. Replacement parts shall be standard and readily available through commercial means. Discontinued products will not be accepted unless approved by the Contracting Officer.

2.3 **Codes.** The design, materials, equipment, and installation shall be in accordance with the requirements of the listed codes and design manuals, with the requirements of this section, and with the listed specifications. The building will be of a noncombustible construction classification. Wood structural elements will not be acceptable.

3. **CIVIL DESIGN**

3.1 **General**. The project consists of the design and construction of the Upgrade Small Arms Firing Range and Support Facility, including associated demolition and site development. Refer to the Project Location Map (Sheet C-1) for the location of the proposed facility. Construction of a small arms range will meet the new Air Force standards. Site development includes a (2) parking lot, concrete firing range surface area and baffles, landscaping, and (2) required utilities. Demolition at the site consists of the removal of buildings 707 and 709 and associated utility demolition.

3.2 **Technical Criteria and Standards.**

3.2.1 U.S. Army Corps of Engineers, Southwestern Division, Architectural and Engineering Instructions Manual (CESWD-AEIM), October 2000.

3.2.2 U.S. Army Corps of Engineers, Architectural and Engineering Manual (USACE-AEI), latest version.

3.2.3 AFM 88-11, Volume 1, Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances.

3.2.4 AFM 88-11, Volume 2, Sanitary and Industrial Wastewater Collection and Pumping Stations and Force Mains.

3.2.5 National Fire Protection Association (NFPA), Fire & Life Safety.

3.2.6 Kirtland Air Force Base, New Mexico. Architectural Compatibility Guide (ACG) for Kirtland AF Operating Instruction 32-1001, 2 November 1998, Kirtland AFB, NM.

3.2.7 National Fuel Gas Code, NFPA 54, latest version.

3.2.8 Uniform Federal Accessibility Standards, Federal Register.

3.2.9 TM 5-822-2, July 1987, General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas.

3.2.10 Manual of Uniform Traffic Control Devices, U.S. Department of Transportation, FHWA.

3.2.11 Development Process Manual, Volume 2. Design Criteria, Municipal Development Department, City Of Albuquerque, latest version.

3.2.12 AFM 88-5, Chap 4, Drainage Areas for Other Than Airfields, latest edition.

3.2.13 AFM 88-10, Vol. 1, Water Supply, Sources and General Considerations.

3.2.14 AFM 88-10, Vol. 5, Water Supply, Water Distribution.

3.2.15 TM 5-813-6, Water Supply, Water Supply for Fire Protection.

3.2.16 Military Handbook MIL-HDBK-1008C, 10 June 1997, Fire Protection for Facilities Engineering Design and Construction.

3.2.17 Military Handbook MIL-HDBK-1005/7A, 1 September 1999, Water Supply Systems.

3.2.18 Interim DOD Antiterrorism/Force Protection Construction Standards, December 16, 1999 (for official use only).

3.2.19 DOD Antiterrorism Construction Standards, August 30, 2001 (for official use only).

(2) 3.2.20 Kirtland Air Force Base 377th Air Base Wing Air Force Materiel Command, Environmental Assessment for Kirtland Air Force Base Sewer Line Project and Firing Range Renovation, December 1999.

3.2.21 U.S. Army Corps of Engineers Engineering Manual 200-1-2 (Technical Project Planning (TPP) Process).

3.2.22 U.S. Army Corps of Engineers Engineering Manual 200-1-3 (Requirements for the Preparation of Sampling and Analysis Plans).

3.2.23 U.S. Occupational Safety and Health Administration regulation 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).

3.2.24 State of New Mexico Environment Department, Hazardous Waste Bureau regulations (NMAC Title 20, Chapter 4).

3.2.25 U.S. Environmental Protection Agency Code of Federal Regulations for Hazardous Materials (40 CFR 260, 261, 262, and 263).

3.2.26 U.S. Environmental Protection Agency Code of Federal Proposed Regulations for Lead Based Paint Debris (40 CFR 260 and 261).

3.2.27 State of New Mexico Environment Department, Solid Waste Bureau regulations (NMAC Title 20, Chapter 9).

3.2.28 U.S. Department of Transportation Hazardous Materials regulations (49 CFR 170 to 180).

3.2.29 U.S. EPA Land Disposal Restrictions (40 CFR 268).

3.2.30 U.S. Army Environmental Hygiene Agency, Waste Characterization Study No. 27-26-JK44-92, dated May 1992-May 1993.

3.2.31 U.S. EPA Solid Waste Testing Methods SW-846-1311 for the Toxic Characteristic Leachate Procedure Preparation Method.

3.2.32 U.S. Army Corps of Engineers Engineering Pamphlet 1110-1-30 (Engineering and Design, Pre-Design Lead/Asbestos Survey Standard Scope of Work).

3.2.33 U.S. Occupational Safety and Health Administration regulation 29 CFR 1926.62 (Lead in Construction). (2)

3.3 **Project Site.** The project site is located on the south side of Southgate Ave, approximately 250 meters (820 ft) southwest of Old Tower Road. See sheet C-2 for location. The site is presently occupied by the existing Small Arms Firing Range which includes buildings 707, 708, and 709. Buildings 707 and 709 will be demolished as part of this contract. Building 708 will remain intact and continue to serve as a storage shed. The Contractor shall indicate project site boundaries on submitted drawings. The plans shall include a project location map and vicinity map that is composed of a vicinity map of the state, and a location map that encompasses the entire project. The Contractor shall show the Contractor's yard, Resident Engineer's Office, Base Civil Engineer's Office, Base Hospital, fire stations and the Contractor's access and haul route on the location map.

3.4 **Project Site Survey.** A detailed survey of the site is not available. The successful bidder shall perform a detailed survey of the site.

3.4.1 **Site Survey Required.** The Contractor shall perform a detailed survey of the project site. The survey shall include a detailed planimetric survey, utilities survey (above and below ground), topography survey at 1-foot contours, and horizontal and vertical control. The survey shall be in 1 inch = 50 feet scale. Horizontal control shall be based on the North American Datum of 1983 (NAD 83) and controlling points shall be occupied as a station within a closed traverse that will meet or exceed Corps Third-Order Class I accuracy. The vertical control shall be based on the North American Vertical Datum of 1988 (NAVD 88) and controlling points shall be established within a closed level loop that shall meet or exceed Corps Third-Order accuracy. The Contractor shall provide 2 benchmarks within or adjacent to the project site. The locations of survey benchmarks, including the benchmark name, coordinates and elevation shall be included in the survey. Provide the name of the firm that performed the survey, how it was accomplished (GPS, total station, etc.), survey dates, target map scale, references to benchmark vertical and horizontal datums, and the coordinate system. The survey requirements listed above shall also apply for areas where existing and new utilities are connected or capped and the routes of new utility lines.

3.5 **Protection from Traffic.** New aboveground electrical appurtenances shall be located to minimize potential damage from vehicles. New above ground electrical devices such as transformers and sectionalizers shall be placed no closer than 6 feet from the gutter line of an existing street. Where traffic damage potential exists, provide pipe guards around devices such as transformers, sectionalizers, poles, guy wires and other appurtenances.

3.6 **Construction Traffic Control.** Construction traffic control shall be provided by the Contractor for all work taking place in roads, or where construction work is staged from roads. Construction traffic control shall conform to the requirements of the Manual On Uniform Traffic Control Devices (MUTCD), latest edition, and all subsequent revisions.

3.7 **Road Closures.** Road closures for utility construction are undesirable. Utility construction in roads shall maintain at least one lane open to traffic, with traffic control measures as specified in the MUTCD. Where road closures are unavoidable, the Contractor shall design detours around the proposed construction area(s). Road closures shall be coordinated two weeks in advance with the Contracting Officer so that Base and emergency services personnel can be notified.

3.8 **Site Demolition.** Existing buildings 707 and 709 shall be demolished, including their entire foundation systems. Refer to paragraph ELECTRICAL DESIGN in Section 01010 for demolition requirements of existing communication and electrical items. The removal of flexible pavement (including associated base course) and fencing is required, as necessary, to accommodate new site (2) features.

Contractor shall demolish target panel baffles in their entirety. Buildings/structures to remain shall be protected. Existing underground water lines, sanitary sewer lines, gas lines, communication lines, fuel lines, and overhead power lines (servicing structures to remain) may require relocation prior to construction of the new Small Arms Firing Range, depending on the site design. Existing septic tank system shall be abandoned in place per requirements of New Mexico Environmental Department's (NMED) Liquid Waste Disposal Regulation - 20.7.3 NMAC, Section 410 - Abandoned Sewers and On-site Liquid Waste Systems. Utility lines whether existing, abandoned, or new will not be allowed to be located under the footprint of the new building. Relocated lines shall be a minimum of 3 meters (10 ft.) outside the new building footprint. Any part of the existing access asphalt road and parking lot that is not demolished shall be resurfaced. Holes or depressions in the ground resulting from demolition (2) operations shall be filled with satisfactory materials and graded to drain in accordance with specification SECTION 02300A - EARTHWORK, and Appendix, Revegetation and Erosion Control. The Contractor shall obtain and comply with a City Of Albuquerque Soil Disturbance permit. Rubble and debris resulting from the demolition process shall be removed from the site. Trees shall not be removed unless required within the approved proposed site plan.

(2) 3.8.1 **Environmental Assessment.** The contractor shall review the Environmental Assessment for Kirtland Air Force Base Sewer Line Project and Firing Range Renovation, dated December 1999, for information concerning existing and potential environmental and hazardous waste concerns. Refer to Appendix P for the Environmental Assessment.

3.8.2 **OSHA Regulations.** All work covered in this section shall also comply with applicable provisions of OSHA regulation 29 CFR 1926.62 (lead in construction). An initial exposure assessment for lead shall be performed in accordance with 29 CFR 1926.62 (d). The scope and applicability of other requirements of this standard such as use of personal protective equipment (PPE), employee training, housekeeping, and medical monitoring shall be determined by the Contractor's "competent person". A worker protection assessment shall be conducted and included in the Accident Prevention Plan.

3.8.3 **Environmental Qualifications.** The contractor shall submit within 90 days after award the names, addresses and qualifications of the environmental

(hazardous waste) firm and analytical laboratory intended for subcontracting for approval by the Contracting Officer. The selected contractor shall submit a site-specific work plan indicating the technical and management approach to each investigation task, including Sampling and Analysis, and Health and Safety. These documents shall be prepared in accordance with Corps of Engineers Engineering Manual 200-1-2 (Technical Project Planning (TPP) Process) and 200-1-3 (Requirements for the Preparation of Sampling and Analysis Plans), and U.S. EPA Code of Federal Regulations for Hazardous Waste Operations and Emergency Response (29 CFR 1910.120).

3.8.4 **Existing Septic System.** If the existing septic system including tanks and leachfield are to be removed, the contractor shall investigate the soil for potential chemical contaminants in accordance with the approved work plan. This investigation work shall be conducted prior to any ground disturbing activities in that area. The contractor shall determine if hazardous constituents are present in the soil in accordance with State of New Mexico Environment Department (NMED), Hazardous Waste Bureau (NMAC Title 20, Chapter 4) and Environmental Protection Agency (EPA) regulations (40 CFR 260 and 261). If classified as hazardous waste, this soil shall be transported in accordance with Department of Transportation (DOT) Hazardous Materials regulations (49 CFR 170 to 180) and EPA regulations (40 CFR 262 and 263) and disposed at an appropriate facility in accordance with the EPA Land Disposal Restrictions (40 CFR 268).

3.8.5 **Lead Abatement.** Buildings 707 and 709 contain materials with detectable quantities of lead based paint (LBP). All building materials shall be disposed of by performing whole-building demolition, therefore, the Waste Characterization Study No. 27-26-JK44-92, dated May 1992 - May 1993 shall apply. The Waste Characterization Study, a study performed by the U.S. Army Environmental Hygiene Agency, assessed the waste characteristics of debris contaminated with LBP. The study focused on the debris generated from the demolition of Army WWII structures. The findings show that whole-building demolition debris shall be characterized as non-hazardous waste.

3.8.5.1 **EPA Rule.** The EPA (40 CFR 260 and 261) proposed rule on the management and disposal of lead-paint debris shall apply. EPA has defined LBP debris as "any component, fixture, or portion of a residence or other building coated wholly or partly with LBP." All material that makes up the whole-building demolition debris (i.e., painted and unpainted wood components, interior partitions, brick, stucco, roofing material, concrete or foundation material) shall comprise a single waste stream at the point of generation when the building is demolished.

3.8.5.2 **Environmental Department.** The New Mexico Environment Department, Hazardous Waste Bureau shall be contacted for approval prior to treating the demolition debris as non-hazardous waste and disposing it in its entirely at an appropriate disposal facility. The Toxicity Characteristic Leachate Procedure (TCLP) test shall be conducted (SW-846-1311) prior to disposal if requested by this Bureau to prove that the demolition debris does not consist of lead-containing hazardous waste.

3.8.5.3 **Visible Inspection.** Prior to demolition, the contractor shall conduct the following actions. Visible dust shall be cleaned from walls, floors, and other exposed surfaces using a High Efficiency Particulate Air (HEPA) vacuum cleaner. Sand from the sand trap will also be removed using a HEPA vacuum system. Material collected shall be disposed of as lead-contaminated hazardous waste. Also, a structural engineer shall determine the percentage of various building components that collectively comprise the whole structure as specified in US Army Corps of Engineers Pamphlet 1110-1-30 (Engineering and Design, Pre-Design Lead/Asbestos Survey Standard Scope of Work). If it is determined that a TCLP test is required, the demolition debris collected for TCLP shall be representative of the structural building components. For example, if 75% of the building components consist of concrete, then 75% of the material collected for the TCLP test should consist of concrete.

3.8.6 **Light Fixture Disposal.** Fluorescent light fixtures were observed throughout building 707 and 709. Light fixtures slated for disposal must be evaluated for mercury and/or PCB's and treated and disposed of as hazardous waste if deemed necessary based on visual inspection and/or test results. Fluorescent light ballasts manufactured before 1979 contain polychlorinated biphenyls (PCB's). Ballasts manufactured after 1979 that do not contain PCB's are labeled "No PCB's". The fluorescent light fixtures in these facilities must be inspected for the presence of these labels. If the ballast is not labeled to this effect, it should be assumed to contain PCB's. Intact non-leaking ballasts may be disposed at a municipal solid waste landfill pending approval from state authorities. Punctured or leaking PCB ballasts are PCB wastes; and therefore, must be handled and disposed according to EPA regulations (40 CFR 260-263, 268), DOT regulations (40 CFR 170-180), and NMED Hazardous Waste Bureau regulations (NMAC.20.4).

3.8.6.1 Disposal of one pound or more PCB's (roughly equivalent to 12-16 fluorescent ballasts) as municipal or industrial solid waste within a 24-hour period is subject to CERCLA reportable quantity requirements promulgated by 40 CFR 302.6. This designation does not apply if they are removed, transported and disposed of in a manner that will not constitute a "release" as defined by CERCLA section 101(22). "Release" is defined as "the abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance". The Contractor's environmental consultant will determine the applicability of this requirement at the time of removal and disposal. The fluorescent ballasts are found to contain PCB's and mercury. The Contractor shall notify the Contracting Officer prior to performing any disposal. The Contractor may receive an equitable adjustment for disposal for the contaminated ballasts.

3.8.6.2 If mercury-containing lights are present, they must be tested using the Toxicity Characteristic Leachate Procedure (TCLP) test (SW-846-1311). If the extract from a representative sample exceeds 0.2 ppm, the lights must be treated, transported, and disposed of as hazardous waste in accordance with according with EPA regulations (40 CFR 260-263, 268), DOT regulations (40 CFR 170-180), and NMED Hazardous Waste Bureau regulations (NMAC.20.4).

(2)

3.9 **Site Development.** In addition to the requirements stated in this section of the RFP, all new design/construction shall comply with the Architectural Compatibility Guide for Kirtland Air Force Base. The site development for this project consists of the complete design and construction of a small arms firing range and support facility. The facility includes
(2) access driveways, a flexible pavement parking area with lighting, pavement striping, sidewalks, curb and gutter, dumpster pad and mechanical pads. Required utilities include fire demand and domestic water lines, gas line, (2) sanitary sewer lines (including force mains if required), sanitary sewer lift station(s) if required, communication lines, fire hydrants, and all associated valves, manholes, fittings, and specials. The firing range area (from firing benches to backstop) shall have a concrete slab or acceptable nonporous rigid surface. A storm drainage system shall be provided including a detention pond if required. Any disturbance to the landscaping adjacent to site shall be repaired/replaced by the Contractor to pre-project condition or better as determined by the Contracting Officer.

3.9.1 **Building Siting.** The facility shall be sited to ensure an interesting, attractive, and functional site taking into consideration the existing features of the site and adjacent facilities. Consideration shall be given to views, solar orientation, and the topography of the site. Site planning shall take into consideration natural characteristics of the environs, climatic conditions, and prevailing winds. Design should capitalize upon economies inherent in the natural characteristics of the site, using existing terrain to minimize cut and fill. Contractors are encouraged to consider energy conservation when developing their proposed building arrangements. The finished floor elevation of the building shall be a minimum of 300 mm (1 ft) above the 100 year flood plain. The building shall be sited on the existing site of buildings 707 and 709 on Southgate Ave. For flood plain locations, refer to the flood hazard report for Kirtland Air Force Base.

3.9.1.2 **Building Setbacks.** Clearances between adjacent buildings must consider requirements for fire protection, safety, privacy, and emergency access. Minimum requirements for standoff distances and building layout are stated in Interim DOD Antiterrorism/Force Protection Construction Standards, December 16, 1999 and DOD Antiterrorism Construction Standards, August 30, 2001.

3.9.2 **Facility Entrances and Driveways.** The proposed site shall be accessible by emergency vehicles, service vehicles, and waste collection
(2) vehicles. Access to the facility shall be provided from driveways off (2)

Southgate Ave. A culvert following the ditch/gutter line shall be provided across this new driveway to pass runoff under the access road. If a culvert cannot be provided, a concrete swale (valley gutter), 0.91 m (3 ft) wide minimum, following the gutter line shall be provided across these new driveways to prevent the concentrated flow of runoff on flexible pavement. Driveways shall be designed for two-way traffic with radii and widths in accordance with the U.S. Army Corps of Engineers, Southwestern Division, Architectural and Engineering Instructions Manual (CESWD-AEIM), dated October 2000, hereinafter as AEIM. New curb cuts on the site shall align with the existing street. There shall be two entrances into the Small Arms Firing Range. One of the required entrances shall be located at the southwest end of the project site and the other at the northeast end of the project site. Each entrance shall incorporate a curb and gutter termination detail to the existing road. The use of a turnaround or similar feature at the road termination is dependent on the site layout and is at the Contractor's discretion.

3.9.3 **Traffic Signs.** The Contractor shall perform a traffic study to determine what type of traffic control is required. Traffic control signs shall be provided by the Contractor on all roads disturbed by construction activity and shall conform to requirements of the Kirtland Air Force Base Architectural Compatibility Guide (ACG). Items not addressed in the ACG shall conform to the U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways.

(2) 3.9.4 **Parking Areas.** The existing parking area for the facility shall be resurfaced. Existing parking allocations shall be maintained. Handicap parking allocations shall comply with the Uniform Federal Accessibility Standards. Refer to the Architectural Design section for the number of building occupants. The parking area layout including offset from the building, offset from adjacent streets, turning radii, lane widths, end island design, parking space size, configuration of the spaces, lanes, and striping of the parking area shall be made in accordance with Section II, Civil design of the AEIM. The existing flexible pavement shall be resurfaced in accordance with the paragraph, GEOTECHNICAL DESIGN. Additional requirements for parking lots are stated in Interim DOD Antiterrorism/Force Protection Construction Standards, December 16, 1999 and DOD Antiterrorism Construction Standards, August 30, 2001.

(2)

3.9.5 **Pavement Marking.** All parking spaces (including handicap parking spaces) and pedestrian crosswalks shall be properly striped to define the parking spaces, crossing areas, and no-parking areas. Pavement marking shall be in accordance with specification SECTION 02763 - PAVEMENT MARKINGS. Striping shall be 100 mm (4 in) wide and white in color, except for handicapped spaces, which shall be blue in color. All pavement marking shall conform to requirements of the Kirtland Air Force Base Architectural Compatibility Guide (ACG). Items not addressed in the ACG shall conform to the U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways. Pavement markings shall be provided at the parking area located west of the building.

3.10 **Borrow Area.** Borrow material shall be obtained from an off-base site, approved by the Contracting Officer. The borrow material shall meet the requirements discussed in Appendix, Final Foundation Design Analysis Example. These requirements shall be addressed in the specifications developed by the Contractor. Borrow material used beneath structures shall be non-expansive. By the 14th day after the last disturbance, the borrow site shall be reclaimed as given in Appendix, "Revegetation and Erosion Control". However, if the borrow site, upon initial disturbance, will not be redistributed for 21 days or more, the borrow site must be temporarily stabilized upon the 14th day since the last disturbance. Note the borrow area location on the project location and vicinity map sheet.

3.11 **Waste Area.** Disposal of demolition and construction waste and debris from the project shall be disposed of at a licensed off-base landfill approved by the Contracting Officer. The disposal of all construction related waste material is the responsibility of the Contractor. There are no approved waste areas within the limits of Kirtland Air Force Base. All waste material shall be disposed in accordance with local, state and federal regulations. The Contractor shall not use base refuse containers for
(2) disposal of construction debris. All wastes shall be disposed of in accordance with NMED, Hazardous Waste Bureau (NMAC Title 20, Chapter 4) and the EPA land Disposal Restrictions (40 CFR 268). (2)

3.12 **Access Haul Route.** The Contractor shall indicate the access haul route (from the entry gate to the contractor's storage yard) on the submitted drawings. The proposed haul route shall be submitted to the Contracting Officer for approval. Haul of material through the Gibson Blvd. gate will not be permitted.

3.13 **Contractor's Storage Yard.** The Contractor's storage and staging area shall be located on or as near as possible to the Small Arms project site as approved by the Contracting Officer. It shall be a maximum of 2 acres, and shall be indicated in the Contractor's proposal. A temporary security fence of 1.83 m (6 ft) minimum height shall be provided around the perimeter of the storage yard. The security of materials shall be the responsibility of the Contractor. The Contractor shall be responsible for dust control and shall submit applicable methods for approval.

3.14 **Grading.** Grading of the site shall be in accordance with section II of the AEIM. The building finished floor shall be 300 mm (12 in) minimum above adjacent finished grade. Care shall be taken to drain surface runoff away from the building to avoid saturating the soils that support the building foundation system. Drainage shall be diverted away from the buildings and firing range area at a 5% minimum slope for the first 10 feet and a slope of at least 2% thereafter. Collection swales shall have a minimum grade of 0.3% and shall be located a minimum distance of 20 feet away from the building. Access road and driveway grades shall not exceed 5%. Minimum road grades shall be as required to adequately drain runoff. A topographic survey is required for the design and construction of this project and shall be the responsibility of the Contractor. See paragraph, **Site Survey**, for additional information. If storm runoff is removed from the project site by sheet flow, the site shall be graded as required to transfer all flows within the site boundaries to indicated discharge location(s). Refer to section, **Storm Runoff and Drainage**, for storm water discharge requirements.

design. Grating areas of surface inlets shall be oversized 100 percent. Avoid locating manholes and surface inlets within the firing range area.

3.15.7 **Roof Drainage.** Runoff from the roof of the building shall be conveyed from the building by overland flow and/or an underground roof drain system as required. Splash blocks shall be in accordance with Plate C19 in the AEIM and shall be provided at all downspouts that are not connected directly to an underground roof drain collection system.

3.15.8 **Storm and Roof Drain Line Materials.** Materials for storm and roof drain lines shall comply with the requirements and standards in specification SECTION 02630 - STORM-DRAINAGE SYSTEM. Pipe joints shall be watertight in accordance with the specification. Metallic pipe shall be removed from the guide specifications as they are not a viable option due to the corrosive nature of the soil. Concrete pipe may be used only for pipe diameters greater than 36 inches. Pipe joints shall be watertight and shall not contain ferrous metallic materials.

3.16 **Utilities.** Existing gas and water utility services are available on and adjacent to the project site. The existing sanitary sewer service for the facility consists of an on site septic system located just north of (2) building 709 that shall be abandoned in place. Utility connections shall be (2) provided for the building as required below. New gas and water service lines shall be connected to the main lines by hot tap if feasible. Interruption of utility services to adjacent facilities including gas, water, and sanitary sewer shall be minimized during construction of the Small Arms Firing Range and shall be coordinated with the Base through the Contracting Officer. Utility bypasses shall be provided where necessary to ensure continued service to Base facilities during construction. The Contractor is responsible for relighting all pilot lights affected by any service interruptions required for construction of the Small Arms Firing Range. All road crossings by utility lines shall be bored and sleeved with schedule 80 PVC or 6 mm (1/4 in) wall steel pipe. Utilities shall not cross roads by open cut without approval of the Base through the Contracting Officer. See drawing sheet C-2 for existing utilities information. These sheets may not reflect all existing utilities, their true location, or recent construction. It shall be the responsibility of the Contractor to verify the existence, location, size, depth and condition of the utilities. Existing utilities shall be shown on the new construction plans. Existing utilities shall be drawn with a line weight that distinguishes them from new utilities. Water and sanitary sewer lines shall not be installed in the same trench. Minimizing utility locations under streets is preferable. Utility distribution lines and sewer mains shall not be located within 10 feet of the building line. Existing utility distribution (water, sanitary sewer and gas) located under or within 10 feet of the new building shall be relocated as required.

3.16.1 **Cathodic Protection.** Cathodic protection shall be provided for all buried ferrous metallic utility components such as valves, fittings, bends, specials, ducts, utility boxes and appurtenances. Refer to Paragraph, ELECTRICAL DESIGN, for additional information.

acceptable and shall be included in the specifications. In addition, the new fire water service line (piping and components) must meet UL and FM Approval requirements for fire protection service.

3.16.2.7. **Water Line Burial Depth.** Water lines shall have a minimum cover of 910 mm (3 ft) except that dedicated fire demand lines shall have a minimum cover of 1220 mm (4 ft).

(2) 3.16.3 **Sanitary Sewer.** The Contractor shall provide a new sanitary sewer line for the facility. The facility sanitary sewer line shall be designed in accordance with *AFM 88-10, Volume 1, Sanitary and Industrial Wastewater Collection - Gravity Sewers* and AFM 88-11 Volume 2, Sanitary and Industrial Wastewater Collection-Pumping Stations and Force Mains if required, except that the minimum velocity at the peak diurnal flow rate (Q_{PD}) in the gravity portions of the line shall be at least 0.61m (2 ft) per second. The diameter of the new gravity sanitary sewer lines shall not be less than 150 mm (6 in). The lateral shall be connected to an existing manhole or a new manhole shall be provided at the connecting point if not connected to an existing manhole. A manhole shall be installed at any change in alignment of the gravity sewer line, whether horizontal or vertical, except that one change in alignment is allowed within 3 m (10 ft) of where the line exits the building when a cleanout is installed at the change of alignment. Existing on-site manholes shall be raised, if required, to meet the new finished grade of the site. The Contractor is responsible for capping and/or relocation of all existing sanitary sewer systems (where applicable). Refer to drawing sheet C-2 for (2) additional information. The new sanitary sewer line shall be discharged into a new septic tank system. The septic tank system shall be designed and constructed in accordance with New Mexico Environmental Department's (NMED) Liquid Waste Disposal Regulation - 20.7.3 NMAC. (2)

3.16.3.1 **Sewer Flow Rates.** Flow rates for the Small Arms Firing Range shall be determined in accordance with AFM 88-11, Volume 1, Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances.

3.16.3.2 **Sewer Line Sizes and Velocities.** Laterals shall have a minimum diameter of 6 inches and mains shall be a minimum diameter of 8 inches. Lines shall be designed for a minimum velocity of 2.0 feet per second for the average daily flow rate and 2.5 feet per second for the 1/2 peak flow rate. When the required minimum average daily flow rate of 2.0 feet per second can not be met in gravity sewer lines (lateral or main), due to inadequate flow, a minimum slope of 0.6% for 6 inch lines, 0.4% for 8 inch lines, and 0.3% for 10 and 12" lines. Line velocity shall not exceed a maximum of 10 feet per second.

3.16.3.3 **Peak Flow Rate Formula.** The peak flow rate is equal to a constant (F) times the average daily flow rate. $F = C/Q^{0.167}$ where, Q = average daily flow rate (mgd, gpd, or gph), and C = a constant (3.8 for mgd, 38.2 for gpd, or 22.5 for gph).

3.16.3.4 **Mannings Formula.** For gravity flow lines, Manning's formula shall be used: $V = (1.486/n)\ R^{2/3}\ S^{1/2}$ where, 'n' values smaller than 0.013 shall not be permitted despite manufacturers' reports of 'n' values between 0.009 to 0.011.

in accordance with "Laboratory Soils Testing" (EM 1110-2-1906) dated 30 November 1970 (incl. Change 2 dated 20 Aug 86). Geotechnical designs shall be based on soil data and technical criteria provided and obtained by subsequent drilling, and shall be in accordance with the Appendix, Foundation Design Analysis Format Example, and the Appendix, Pavement Design Analysis Format Example. The Contractor is responsible for all applicable drilling and testing costs and acquisition of all clearances and permits from the Base Civil Engineer's Office. The Contractor is also responsible for the protection of all underground utilities from damage by the field investigations. The site
(2) shall be returned to its original state after drilling. No geotechnical drilling shall be conducted in the leachfield, septic tank area, and range firing area until the area has been characterized by the hazardous waste investigation and determined to not contain hazardous constituents. (2)

4.5 **Borrow Areas**. There are no approved borrow sites on base. The Contractor shall be responsible for locating an off base borrow source; testing and providing required data to the Government for approval of all proposed off base borrow sources. The borrow must meet all specification requirements and shall not be used prior to approval.

4.6 **Foundation Design Analysis**. The Contractor shall prepare a Foundation Design Analysis (FDA). The foundation design requirements for this project are as follows and as provided in the Structural Design section of the RFP. Site conditions are generally indicated by previously discussed geotechnical investigation (i.e., soil type, densities of materials, etc.); cut and fill requirements for site development are unknown; size and location of the facility are discussed in other sections of this RFP. Foundations shall be constructed of steel reinforced concrete and shall be as required in the Structural Design section of the RFP. Allowable foundation options shall be limited to include spread footings with slab on grade, grade beams with post tensioned slab, and drilled piers with grade beams. Selection of foundation system shall be based upon structure function and soil conditions at the site. Building Research Advisory Board (BRAB) foundation systems/design will not be allowed. Basements will not be allowed. Foundation designs and recommendations for features such as retaining walls, perimeter walls, etc., are the Contractor's responsibility and will be included as part of the FDA. Therefore, design of any foundation system to support any structure(s) is also required. The design of any foundation system shall include, but not be limited to, presentation of allowable bearing capacity, soil parameters, settlement or consolidation, other applicable soil properties (i.e., permeability, shear strength, etc.) and all associated calculations. The FDA shall describe, evaluate, and present for each site all boring locations, boring logs, subsurface profiles, a plasticity chart, gradation curves, moisture content/liquid limit/plastic limit versus depth chart, moisture content/dry density versus depth chart, standard penetration blow count versus depth chart, unconfined compression test results, and consolidation-controlled expansion test results, as applicable. The FDA narrative and data presentation shall be submitted as an individual document to the U.S. Army Corps of Engineers for review and approval. The narrative and all data shall be prepared and presented in the format shown in the Government-furnished Appendix, Foundation Design Analysis Format Example. Analysis for design shall be prepared separately from the design narrative and data presentation. Any unusual features shall also be addressed such as above ground and/or underground structures (i.e., pits, manholes, retaining walls, etc.) and associated soil parameters. The FDA shall also discuss deformation sensitive

(2) 6.4.2.2 All grid lines shall be labeled for the element that they locate on the foundation and framing plans. (2)

6.4.2.3 Section and Detail Drawing Scales: All roof and floor framing (2) sections and details shall be drawn at a minimum scale of 1-1/2" = 1'0". (2)

6.4.3 **CESPA Standard Structural Drawing Sheets.** The design drawings shall contain structural notes and typical details. These notes and details shall contain a list of the design loading criteria, a list of the strengths of the engineering materials used, the soil design values, and any other data that would be pertinent to remodeling and/or future additions. Reference CESPA Standard Structural Drawing Sheets S1, S2, S3, S4 and S5 for required minimum standard structural notes and typical details. These five sheets shall be placed as the first five sheets of the contract drawings no matter the size of the drawing sheets. There are two sets of Sheets S1, S2, S3, S4 and S5, one for reinforced ribbed mat slabs (RRMS) and one for "Floating Slabs" foundation systems as noted on the respective drawings. Standard sheets RM1, RM2 & RM3 are for RRMS foundation systems for use on layout of the ribs (sheet RM1) and typical foundation details (sheet RM2 and RM3). For electronic copies of these standard structural drawings go to web site http://www.spa.usace.army.mil/ec/cadd/index.htm, click on "Discipline Specific Requirements" and click on "Structural." The contact for these drawings is Mr. Mike Mitchell with the CESPA COE at 505-342-3409, Fax 505-342-3497 or email at Michael.e.Mitchell@usace.army.mil. These standard drawings are in MicroStation format. The minimum requirements for the respective notes are described in detail throughout this CESPA structural criteria document.

6.5 **References**. Design methods and allowable stresses or load factors for the various structural materials shall be in accordance with current Air Force engineering and technical manuals (AFM), technical instructions (TI-), engineering regulations (ER-), engineering technical letters (ETL-) and codes and specifications (AISC, ACI, SJI, and etc.). Recommendations made in the codes, specifications and industry standards in this paragraph are requirements of this RFP document, unless specified otherwise. The references used for the design and contract documents of this project shall be included in any design analysis required for this project.

6.5.1 **COE Engineering Manuals:**

6.5.1.1 Southwest Division, Architectural Engineering Instruction Manual (CESWD-AEIM), October 2000, Chapter IV, "STRUCTURAL".

6.5.1.2 USACE TI 809-04 - Seismic Design For Buildings (31 December 1998).

6.5.1.3 TM 5-809-3/AFM 88-3, Chapter 3 - Masonry Structural Design for Buildings (October 92).

6.5.1.4 USACE TI 809-07 - Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls (30 November 1998).

6.5.1.5 USACE TI 809-29 - Structural Considerations for Metal Roofs (3 August 1998).

6.5.1.6 USACE TI 809-52 - Commentary on Snow Loads (3 August 1998).

6.5.1.7 ER 1110-345-53 - Structural Steel Connections, (22 July 1994).

6.5.1.8 ER 1110-345-700 - Design Analyses - 30 May 1997.

6.5.1.9 ERDC/ITL TR-01-6 - The CADD/GIS Technology Center, "A/E/C CADD Standard", Release 2.0, September 2001.

(2) 6.5.1.10 Interim Department of Defense Antiterrorism/Force Protection Construction Standards, dated December 16, 1999 with errata dated 16 Feb 00, Paragraph AP2.4.1, "Structural".

6.5.1.10a Department of Defense Interim Antiterrorism/Force Protection Construction Standards, Progressive Collapse Design Guidance, dated 4 April 2000. (2)

6.5.1.11 TI-809-28 - Design and Construction of Conventionally Reinforced Ribbed Mat Slabs (RRMS) (15 Sep 1999).

6.5.1.12 ETL 01-13 - Small Arms Range Design and Construction (31 Dec 2001).

6.5.1.13 AFI 31-101 - The AF Installation Security Program (FOUO).

6.5.1.14 AFMAN 32-1071 - Security Engineering Project Development (FOUO).

6.5.1.15 Design Criteria for Ribbed Mat Slab Foundations, 29 January 1988.

6.5.2 **Codes and Specifications.**

6.5.2.1 AISC-M018L - Load and Resistance Factor Design Specification for Structural Steel Buildings by American Institute of Steel Construction (AISC, Second Edition).

6.5.2.2 AISC-M019L - Load and Resistance Factor Design Specification, Volume II-Connections by American Institute of Steel Construction (AISC, Second Edition).

6.5.2.3 International Building Code 2000, (IBC 2000).

6.5.2.4 Building Code Requirements for Structural Concrete by the American Concrete Institute (ACI 318/318M-99).

6.5.2.5 Precast and Prestressed Concrete Manuals by the Prestressed Concrete Institute (PCI).

6.5.2.6 Building Code Requirements for Concrete Masonry Structures by American Concrete Institute (ACI 531-95).

6.5.2.7 Standard Specifications and Load Tables for Open Web Joists by the Steel Joist Institute (SJI)-(1994).

6.5.2.8 ASCE 7-98 - Minimum Design Loads for Buildings and Other Structures by the American Society of Civil Engineers (ASCE).

6.7.7 Weapons and Ammunition Storage: Vault construction must satisfy the requirements of AFI 31-101, AFMAN 32-1071, and ETL 01-13. The minimum requirements for vault construction features of walls, floors, and roof shall be 8 inches (200 mm) thick concrete reinforced with two layers of #13 bars at 9" (225 mm) O.C.E.W.

6.7.8 Firing platform shall be constructed of reinforced concrete.

6.7.9 The structural design analysis items shall be written to directly address paragraph numbers in the RFP document and ETL 01-13.

6.8 **Design Criteria.**

6.8.1 **Serviceability.**

6.8.1.1 Foundation Settlement. An adequate level of protection against structural failure due to uniform and/or differential foundation settlement or general shear shall be provided.

6.8.1.2 Vertical Deflection of Suspended Horizontal Framing Members.

6.8.1.2.1 Building serviceability shall not be impaired by vertical deflections. Concrete on steel deck floor slab systems shall comply with the vibration criteria of the SJI for floor joists and AISC for floor purlins and main supporting members. Provide structural floor vibration calculations as part of the structural calculations of the Design Analysis. Vertical deflections shall be limited to the following criteria.

a. L/240 for roofs live loads.
b. L/600 for masonry walls and lintels, and supports of masonry walls.
c. L/360 for floor live loads and L/240 for floor total loads.

6.8.1.3 Horizontal Deflection (drift): Horizontal drift shall not exceed the limits set forth in USACE TI 809-04, Table 6-1 or IBC 2000, Table 1617.3 when the structure is subjected to the required seismic or wind criteria.

6.8.1.4 Ultimate Strength of Structural Elements: An adequate level of protection against structural failure under extreme loads shall be provided. The proposer shall check the usual loading conditions for normal factors of safety and the extreme loading conditions, if present, for appropriate (unusual) factors of safety to provide levels of protection appropriate for the conditions.

(2) 6.8.2 **Anti Terrorist Precautions.** Antiterrorist precautions shall be taken into consideration for this project in accordance with the structural requirements of the following references:

a. Interim Department of Defense Antiterrorism/Force Protection Construction Standards, dated December 26, 1999 with errata dated 16 Feb 00, paragraph AP2.4.1, "Structural".

b. Department of Defense Interim Antiterrorism/Force Protection Construction Standards, Progressive Collapse Design Guidance, dated 4 April 2000. Use the "indirect" design process. (2)

APPENDIX INDEX

with this project and describes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities include OSHA Class I and Class II work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its subcomponents, the Asbestos Hazard Abatement Plan and Activity Hazard Analyses required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS.

1.3.1 Abatement Work Tasks

(2) ACM to be abated is as follows:

MATERIAL	LOCATION	QUANTITY
12x12 floor tile	Bldg 707, classroom/cleaning room	1600 SF (1080 SF is this total is under carpeting)
floor mastic	Bldg 707, classroom/cleaning	1600 SF
drywall/joint compound	Bldg. 707 ceiling/walls throughout except firing range	5500 SF
9x9 floor tile	Building 709 hallway and weapons maintenance area	750 SF
mastic under 9x9 tile	Building 709, hallway and weapons maintenance area	750 SF
12x12 floor tile	Building 709 office areas under carpeting	900 SF
mastic under 12x12 tile	Building 709 office areas	900 SF
linoleum tile	Building 709 storage area	100 SF
mastic under tile	Building 709 storage area	100 SF
roofing material	Building 709	4500 SF
24x24-inch flex connector	Building 709 boiler room	1 total

(2)

1.3.2 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer (CO) who will have the option of ordering additional bulk samples to be obtained at the Contractor's expense and delivered to a laboratory accredited under the National Institute of Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM at no additional cost to the Government. Any additional components identified as ACM that have been approved by the Contracting Officer for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes". Sampling activities undertaken to determine the presence of additional ACM shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course required by 40 CFR 763, Subpart E, Appendix C.

made by the Contractor's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, shall have the authority to take immediate action to upgrade or downgrade respiratory type when there is an immediate danger to the health and safety of the wearer. Respirators shall be used in the following circumstances:

a. During all Class I asbestos jobs.

b. During all Class II work where the ACM is not removed in a substantially intact state.

c. During all Class II and III work which is not performed using wet methods. Respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and ACM is removed in an intact state.

d. During all Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment.

e. During all Class III jobs where TSI or surfacing ACM is being disturbed.

f. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.

g. During all work where employees are exposed above the PEL-TWA or PEL-Excursion Limit.

h. In emergencies

(2) 1.12.3 Deleted.

(2)

1.12.3 Class II and III Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment;.

1.12.4 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed bilingually in English] and Spanish and in pictographs and graphics shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 500 by 350 mm (20 by 14 inches), and displaying the following legend in the lower panel:

(2)

(2)

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
[RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA]

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided as shown and described on DETAIL SHEET 11. Decontamination unit signage shall be as shown and described on DETAIL SHEET 15.

1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall be as described in DETAIL SHEET 14, shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1.20 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle

Glovebags shall be provided as described in 29 CFR 1926, Section .1101. The glovebag assembly shall be 0.15 mm (6 mil)6 mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA warning label.

1.24.1 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

1.24.2 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101 (2) (2)

1.24.3 Disposal Bags

Leak-tight bags, 0.15 mm (6 mil) thick, shall be provided for placement of asbestos generated waste (2) (2)

1.24.5 Cardboard Boxes

Heavy-duty corrugated cardboard boxes, coated with plastic or wax to retard deterioration from moisture, shall be provided if required by state and local requirements. Boxes shall fit into selected ACM disposal bags. Filled boxes shall be sealed leak-tight with duct tape. (2) (2)

1.24.6 Sheet Plastic

Sheet plastic shall be polyethylene of [0.15 mm (6 mil)] [6 mil] minimum thickness and shall be provided in the largest sheet size necessary to minimize seams, as indicated on the project drawings. Film shall be [clear] [frosted] [or] [black] and conform to ASTM D 4397, except as specified below:

1.24.1.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets shall be provided. Film shall conform to the requirements of NFPA 701.

1.24.1.2 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

1.24.2 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

1.24.3 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 60 degrees C (140 degrees F).

1.24.4 Leak-tight Wrapping

(2) Asbestos abatement work tasks shall be performed as summarized in paragraph DESCRIPTION OF WORK and the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses. The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. All hot work (burning, cutting, welding, etc.) shall be conducted under controlled conditions in conformance with 29 CFR 1926, Section .352, Fire Prevention. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal. The Contractor shall stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. The Contractor shall correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work shall resume only upon notification by the Contracting Officer. Corrective actions shall be documented. (2)

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work shall proceed.

3.3 OBJECTS

3.3.1 Removal of Mobile Objects

Mobile objects, furniture, and equipment will be removed from the area of work by the Government before asbestos abatement work begins. Carpets, draperies, and other items which may not be suitable for onsite wet cleaning methods shall be disposed of as asbestos contaminated material.

3.3.2 Stationary Objects

Stationary objects, furniture, and equipment, shall remain in place and shall be pre-cleaned using HEPA vacuum followed by adequate wet wiping. Stationary objects and furnishings shall be covered with 2 layers of polyethylene and edges sealed with duct tape.

3.3.3 Reinstallation of Mobile Objects

resulting from the cutting operations shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material shall not be dropped or thrown to the ground, but shall be lowered to the ground via covered, dust-tight chute, crane, hoist or other method approved by the Contracting Officer. Any ACM that is not intact shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. While the material remains on the roof it shall be kept wet or placed in an impermeable waste bag or wrapped in plastic sheeting. Intact ACM shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. Unwrapped material shall be transferred to a closed receptacle precluding the dispersion of dust. Critical barriers shall be placed over roof level heating and ventilation air intakes.

(2) 3.5.6.4 Deleted.

(2)

3.5.6.5 Other Class II Jobs

The Contractor shall use the following work practices when performing Class II removal of drywall material containing ACM: The material shall be thoroughly wetted with amended water prior and during its removal. The material shall be removed in an intact state. Cutting, abrading or breaking the material is prohibited. The ACM removed shall be immediately bagged or wrapped.

3.5.7 Specific Control Methods for Class III Work

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees. The work shall be performed using wet methods and, to the extent feasible, using local exhaust ventilation. The Contractor shall use impermeable dropcloths and shall isolate the operation, using mini-enclosures or glovebag systems, where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of TSI or surfacing material.

3.5.8 Specific Control Methods for Class IV Work

Class IV jobs shall be conducted using wet methods, HEPA vacuums, and prompt clean-up of debris containing ACM. Employees cleaning up debris and waste in a regulated area where respirators are required shall wear the selected respirators.

3.5.9 Alternative Methods for Roofing Materials and Asphaltic Wrap

The Contractor shall use the following engineering controls and work practices when removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof cements, mastics, coatings, or flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds. If during the course of the job the material does not remain intact, the Contractor shall use the procedures described in paragraph, Roofing Material. Before work begins, and as needed during the job, the Designated Competent Person shall conduct an inspection and determine that the roofing material is intact and

APPENDIX O

SOIL TESTING DATA

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 1 @ 2.5'

SAMPLE LOCATION: Silty Sand - (SM)

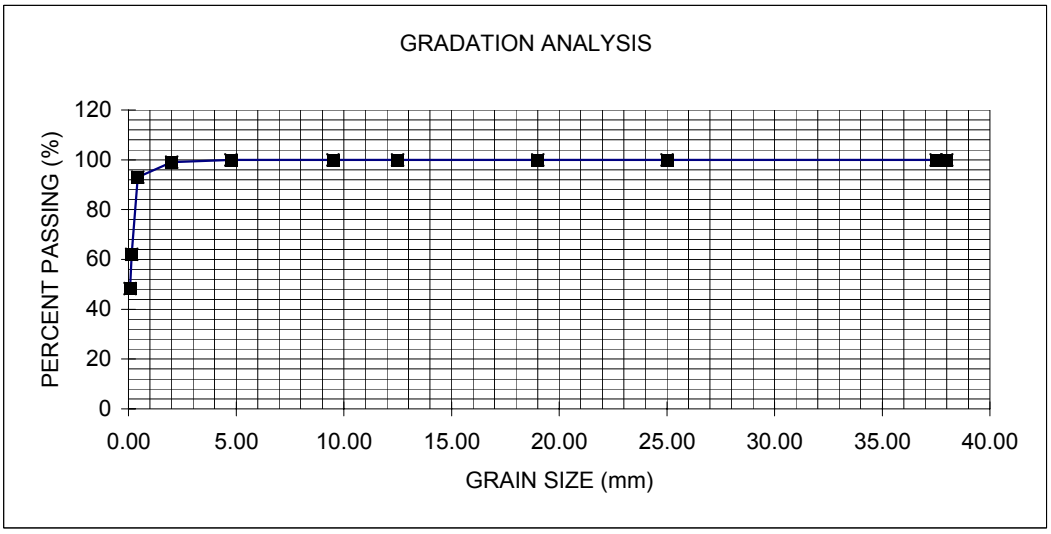
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	100
No. 10	99
No. 40	93
No. 80	62
No. 200	48.3

Moisture Content (%): 13.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 1 @ 5'

SAMPLE LOCATION: Silty Clay - (CL)

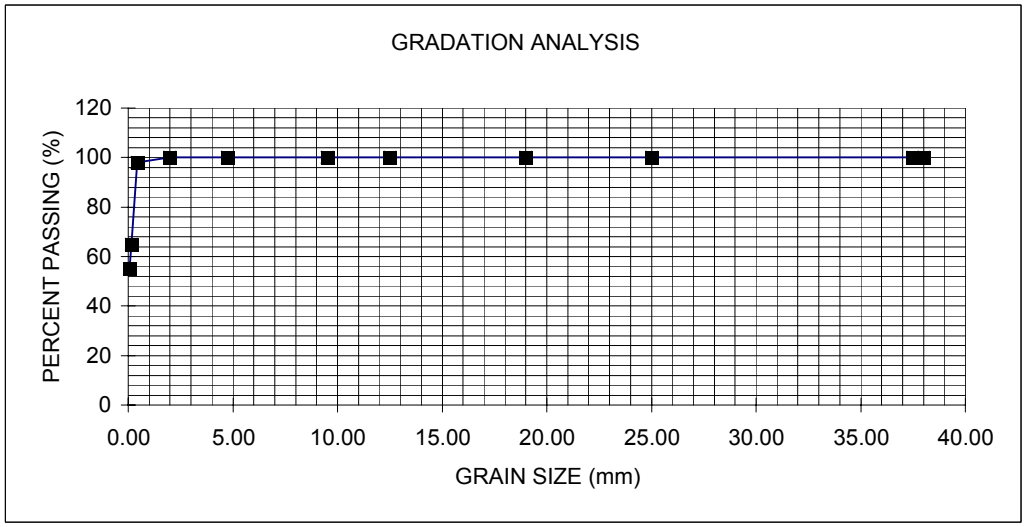
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	30
Plasticity Index:	16

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
No. 10	100
No. 40	98
No. 80	65
No. 200	55.0

Moisture Content (%): 14



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 1 @ 7.5'

SAMPLE LOCATION: Silty Clay - (ML)

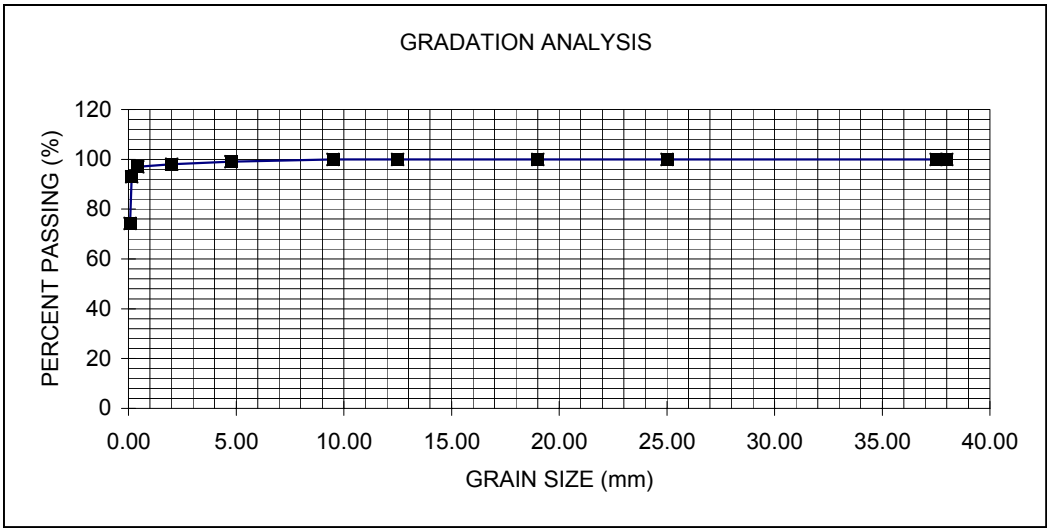
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/8"	100
No. 4	99
No. 10	98
No. 40	97
No. 80	93
No. 200	74.3

Moisture Content (%): 20.5



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 1 @ 10'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

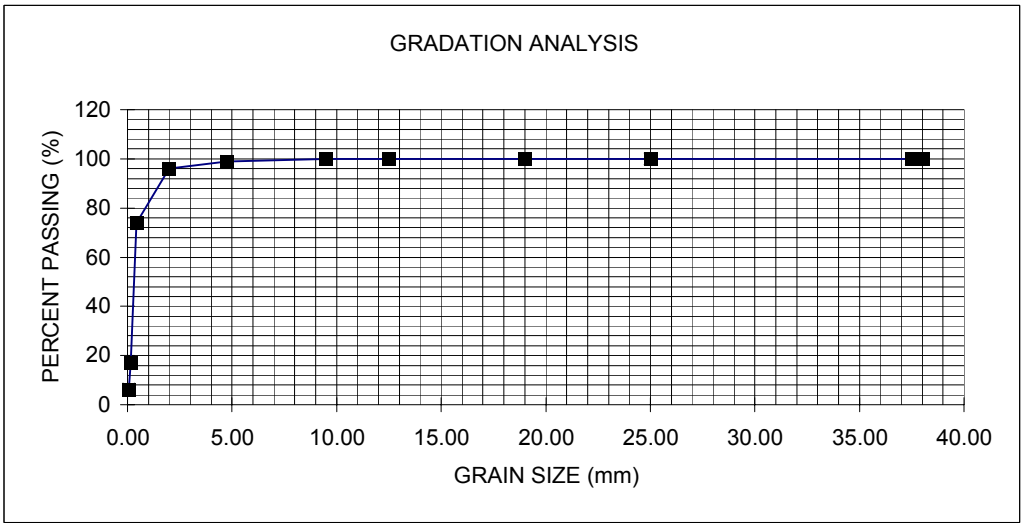
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/8"	100
No. 4	99
No. 10	96
No. 40	74
No. 80	17
No. 200	6.3

Moisture Content (%): 4.4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 2.5'

SAMPLE LOCATION: Silty Sand - (SM)

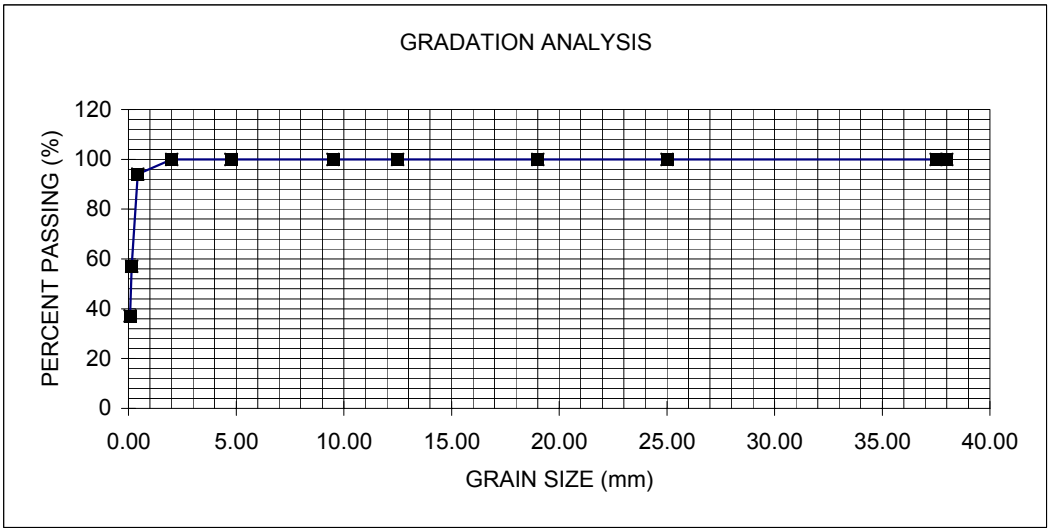
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/8"	100
No. 4	100
No. 10	100
No. 40	94
No. 80	57
No. 200	31.1

Moisture Content (%): 13.9



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

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July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 5'

SAMPLE LOCATION: Sand - poorly graded (SP)

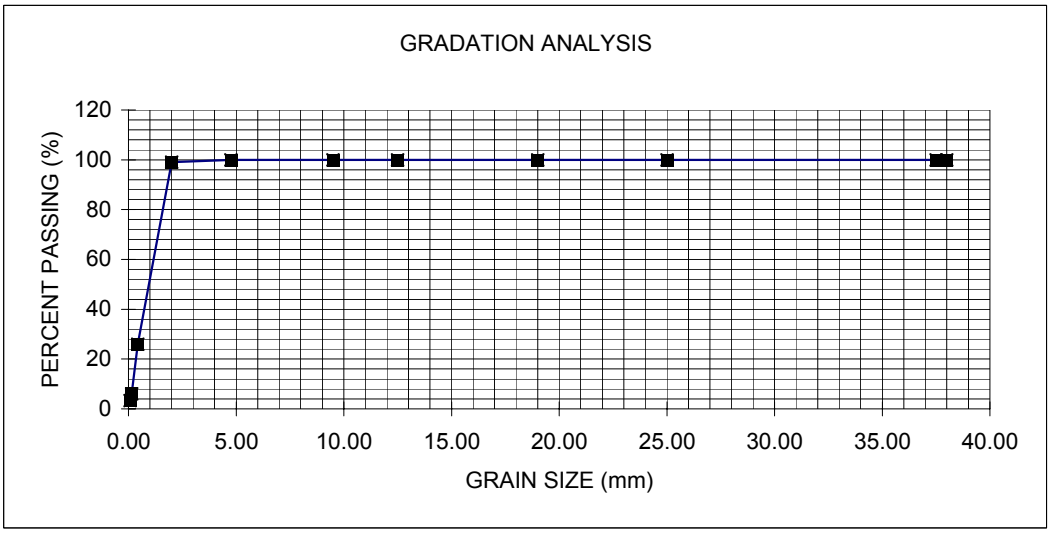
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	100
No. 10	99
No. 40	26
No. 80	6
No. 200	3.4

Moisture Content (%): 3



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

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July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 7.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

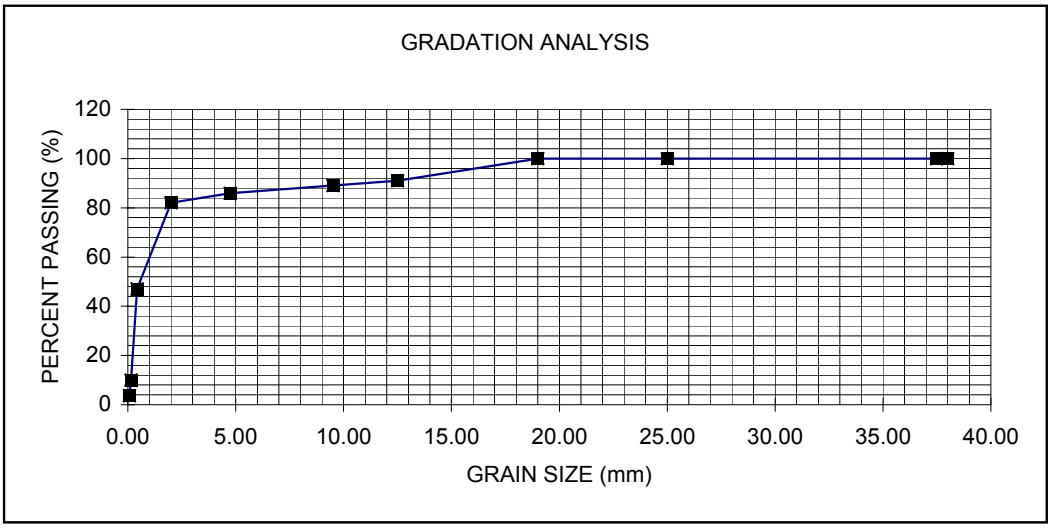
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	91
3/8"	89
No. 4	86
No. 10	82
No. 40	47
No. 80	10
No. 200	3.7

Moisture Content (%): 3.2



Respectfully Submitted:
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July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 10'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

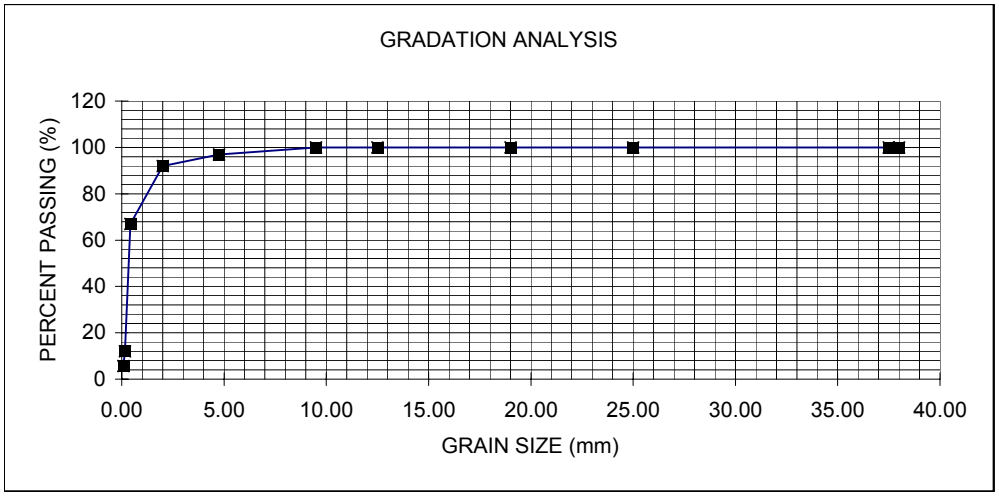
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	97
No. 10	92
No. 40	67
No. 80	12
No. 200	5.6

Moisture Content (%): 2.7



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GEO-TEST, INC.

Tim Byres, SET

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Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 12.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

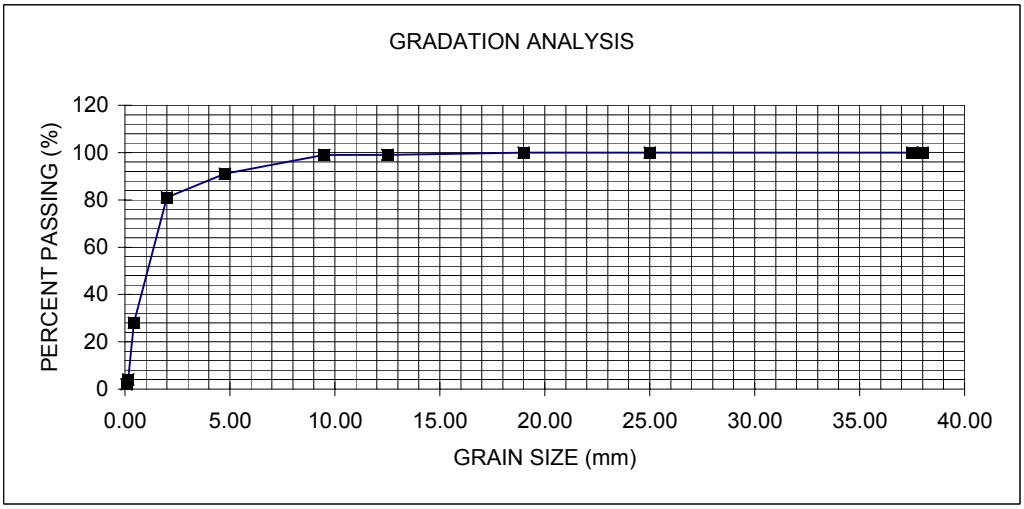
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	91
No. 10	81
No. 40	28
No. 80	4
No. 200	2.0

Moisture Content (%): 3



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Tim Byres, SET

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Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 15'

SAMPLE LOCATION: Clayey Sand - (SC)

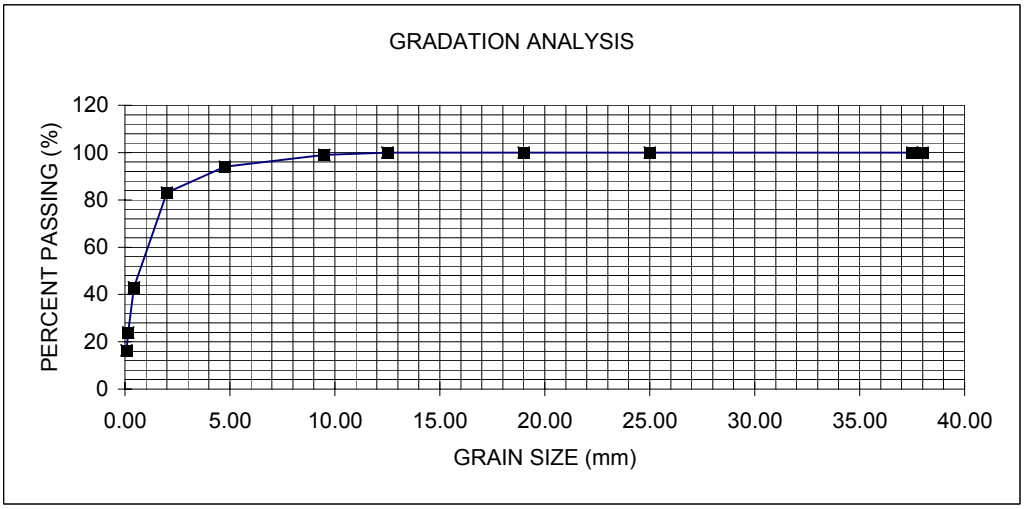
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	27
Plasticity Index:	13

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	94
No. 10	83
No. 40	43
No. 80	24
No. 200	16.4

Moisture Content (%): 7.9



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Tim Byres, SET

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July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 17.5'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

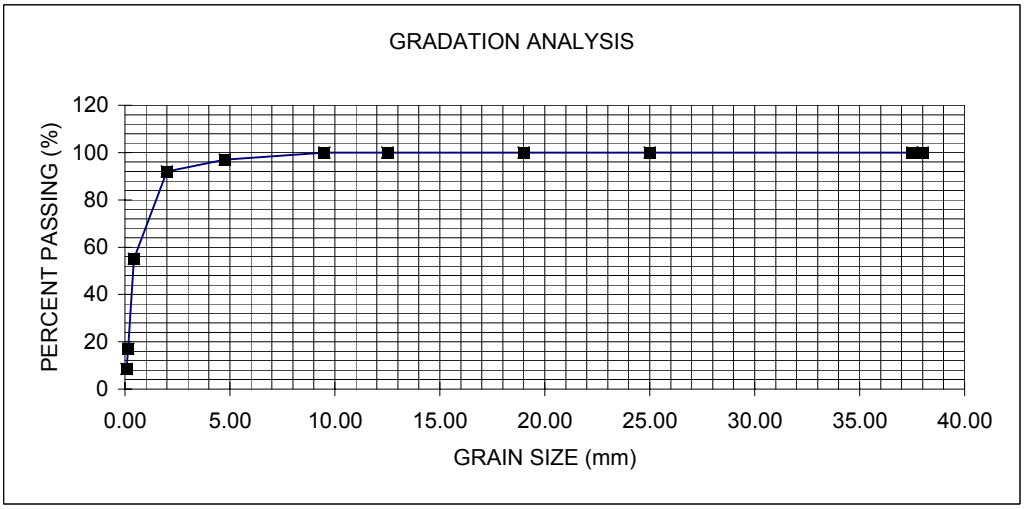
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	97
No. 10	92
No. 40	55
No. 80	17
No. 200	8.5

Moisture Content (%): 7.5



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Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 20'

SAMPLE LOCATION: Sand - poorly graded (SP)

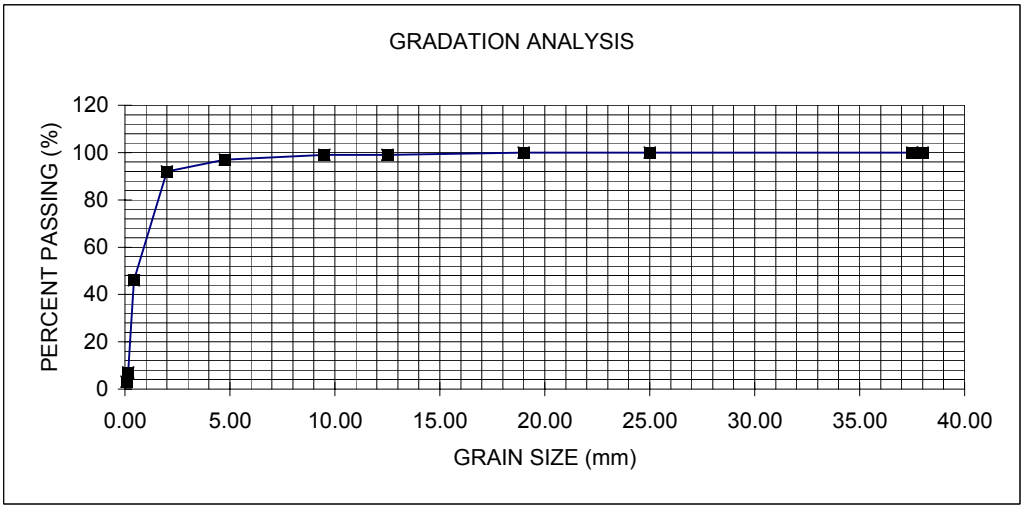
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	97
No. 10	92
No. 40	46
No. 80	7
No. 200	3.1

Moisture Content (%): 4.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 22.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

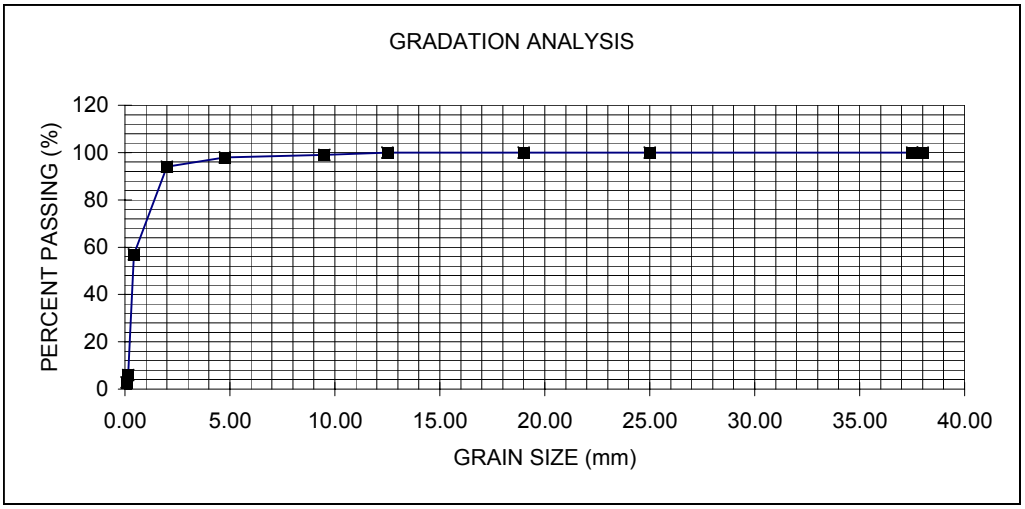
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	98
No. 10	94
No. 40	57
No. 80	6
No. 200	2.8

Moisture Content (%): 4.4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 2 @ 25'

SAMPLE LOCATION: Sand - poorly graded (SP)

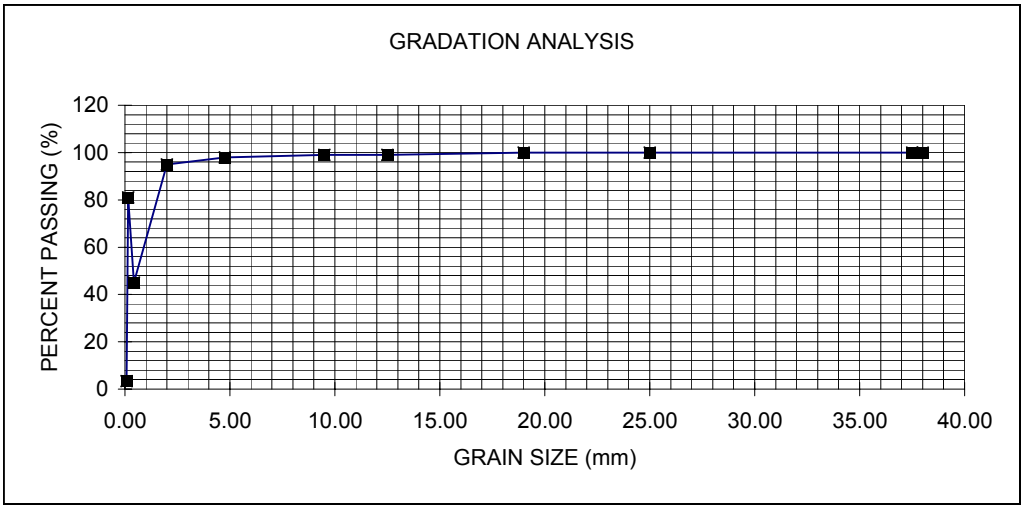
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	98
No. 10	95
No. 40	45
No. 80	81
No. 200	3.4

Moisture Content (%): 6.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 2.5'

SAMPLE LOCATION: Silty Sand - (SM)

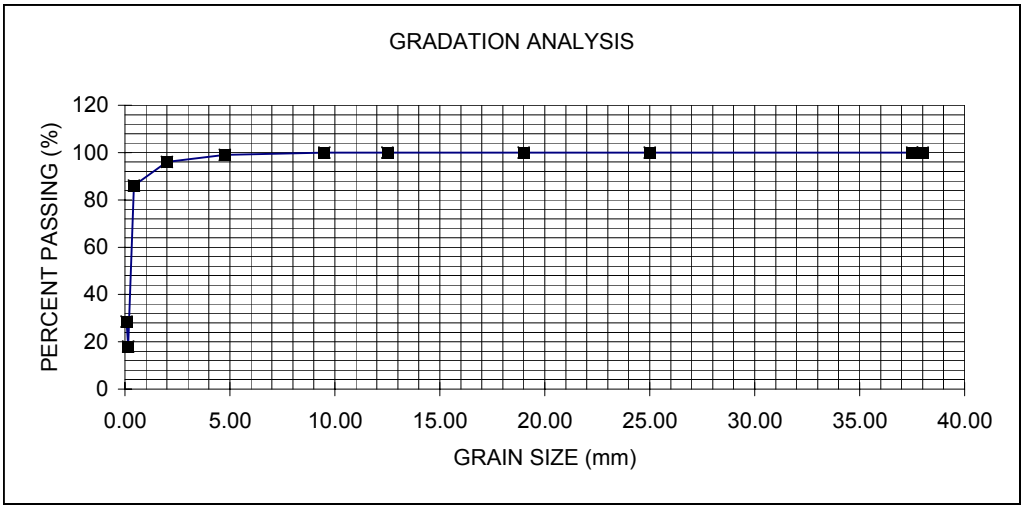
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	99
No. 10	96
No. 40	86
No. 80	18
No. 200	28.6

Moisture Content (%): 10.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 5'

SAMPLE LOCATION: Sand - poorly graded (SP)

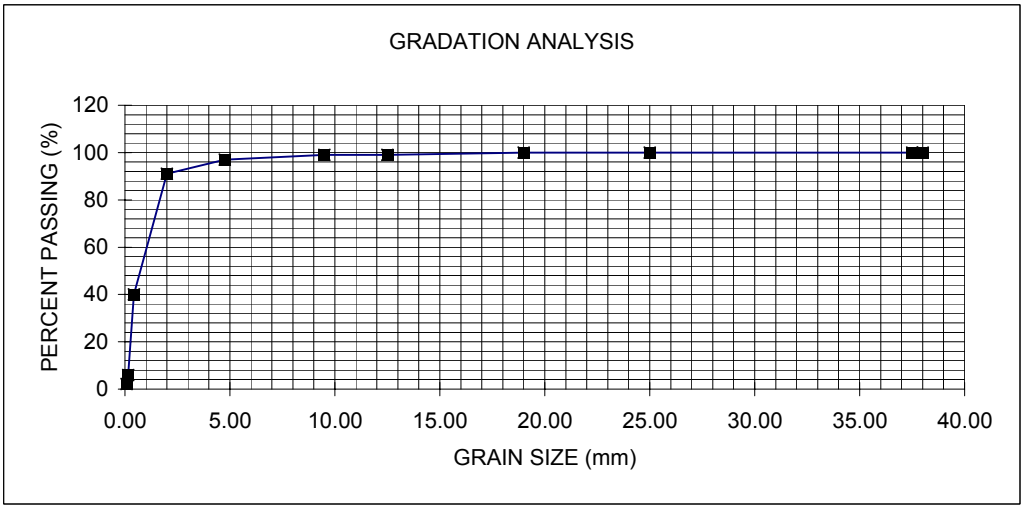
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	97
No. 10	91
No. 40	40
No. 80	6
No. 200	2.1

Moisture Content (%): 2.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 7.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

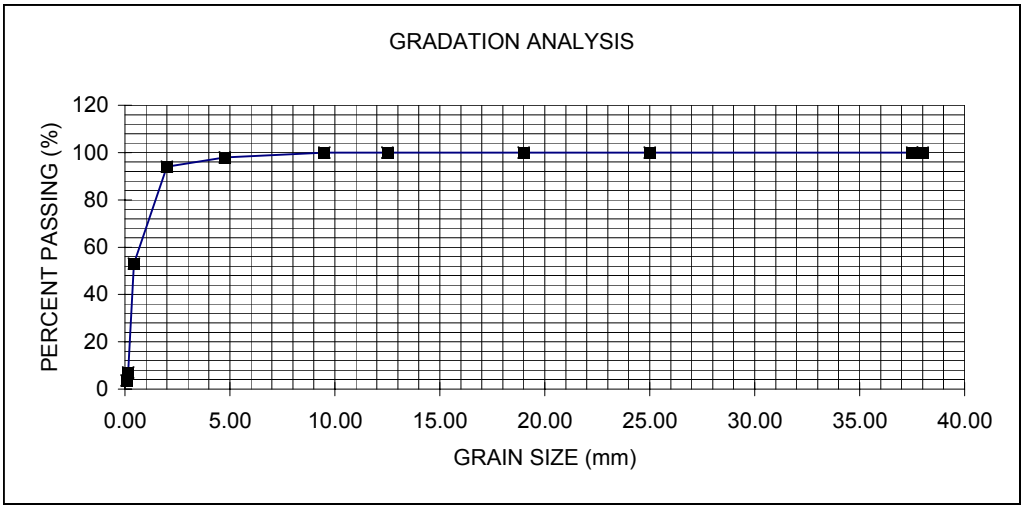
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	98
No. 10	94
No. 40	53
No. 80	7
No. 200	3.7

Moisture Content (%): 2.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 10'

SAMPLE LOCATION: Silty Sand - (SM)

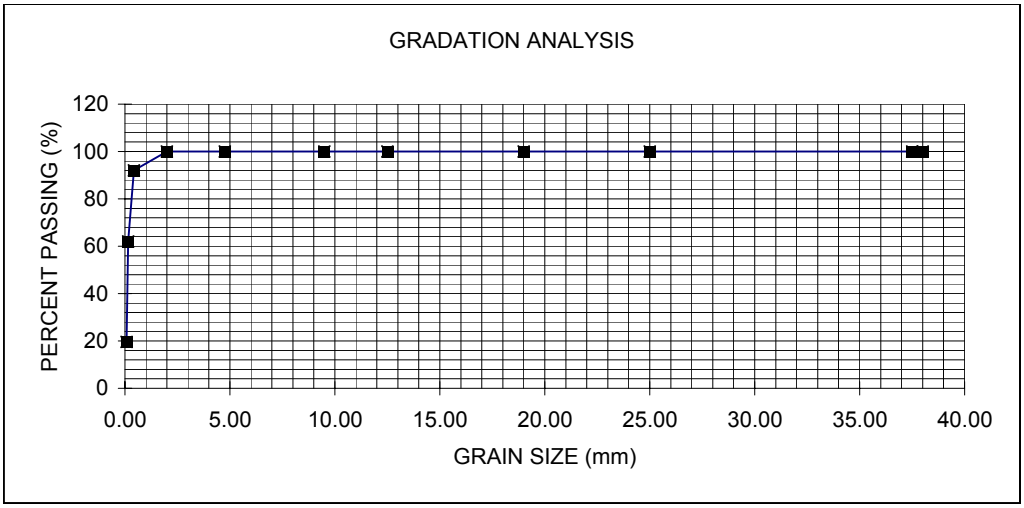
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
No. 10	100
No. 40	92
No. 80	62
No. 200	19.6

Moisture Content (%): 7.5



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

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Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 12.5'

SAMPLE LOCATION: Silty Sand - (SM)

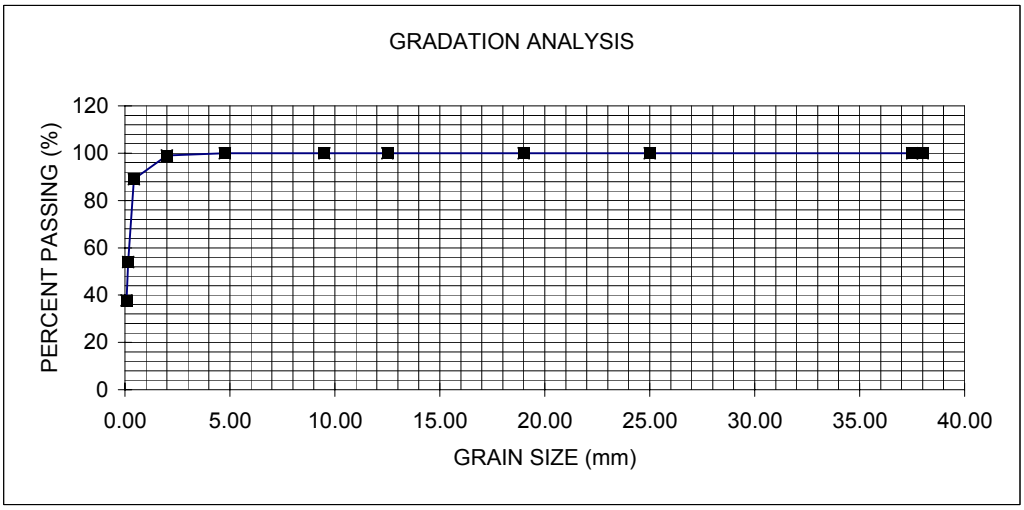
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/8"	100
No. 4	100
No. 10	99
No. 40	89
No. 80	54
No. 200	37.8

Moisture Content (%): 13.8



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 15'

SAMPLE LOCATION: Sand - poorly graded (SP)

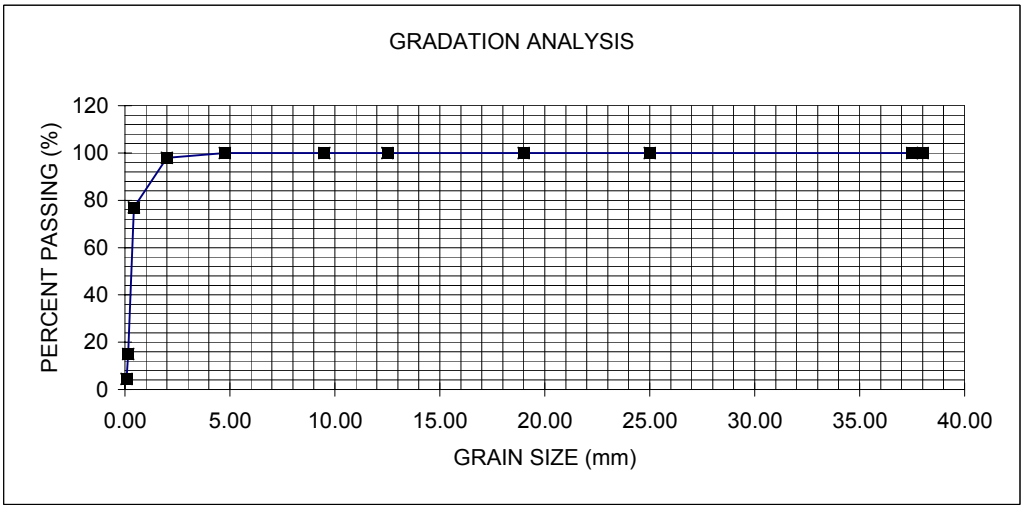
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
No. 4	100
No. 10	98
No. 40	77
No. 80	15
No. 200	4.5

Moisture Content (%): 6.4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 17.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

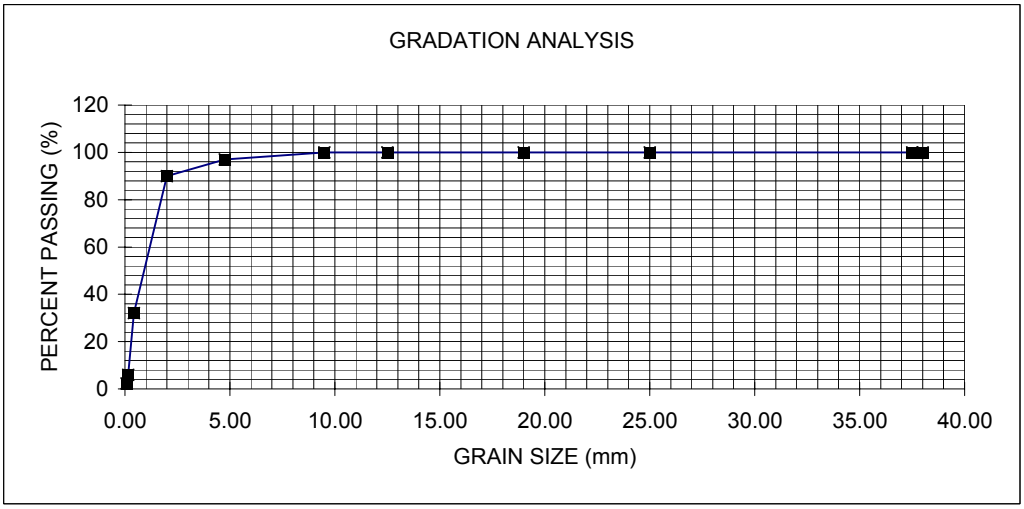
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	97
No. 10	90
No. 40	32
No. 80	6
No. 200	2.3

Moisture Content (%): 2.6



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 20'

SAMPLE LOCATION: Sand - poorly graded (SP)

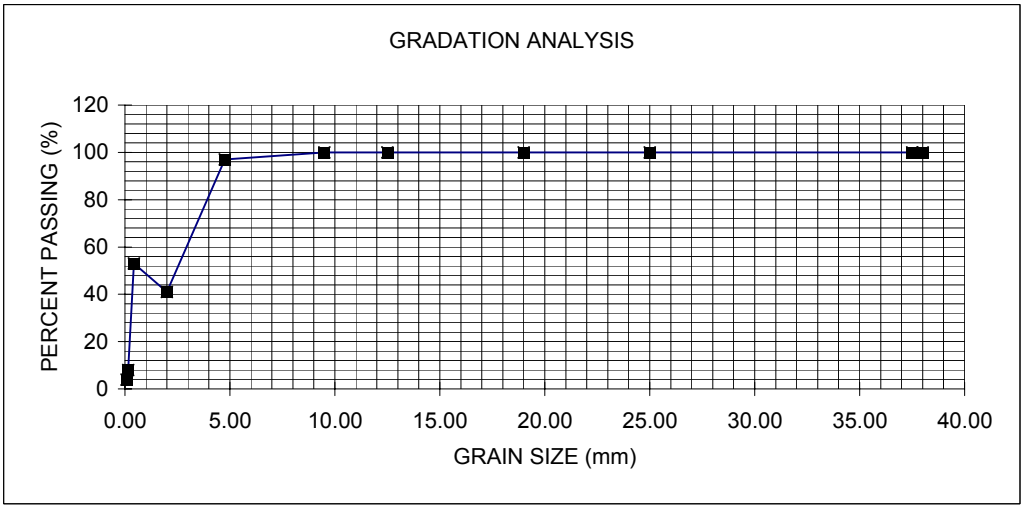
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	97
No. 10	41
No. 40	53
No. 80	8
No. 200	3.9

Moisture Content (%): 5.6



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 3 @ 22.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

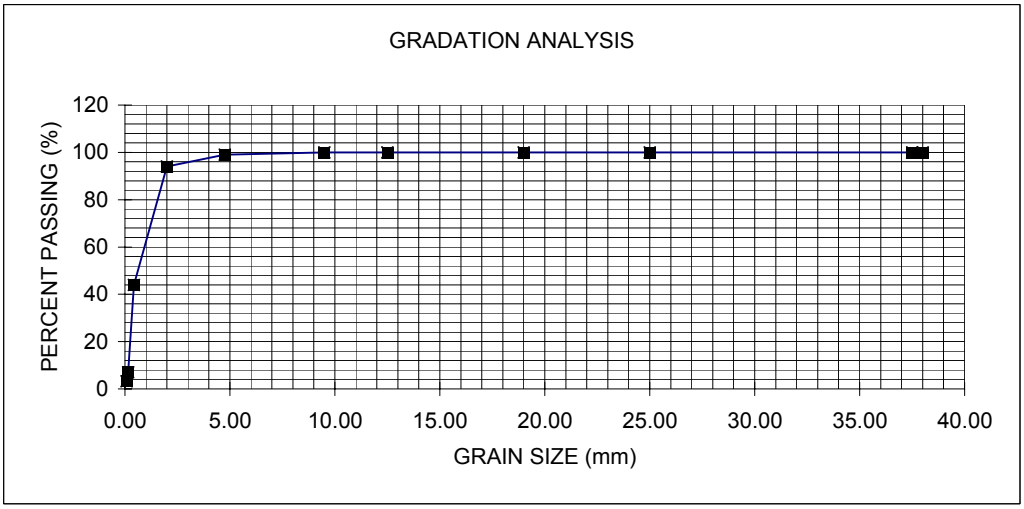
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	99
No. 10	94
No. 40	44
No. 80	7
No. 200	3.3

Moisture Content (%): 3.8



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 2.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

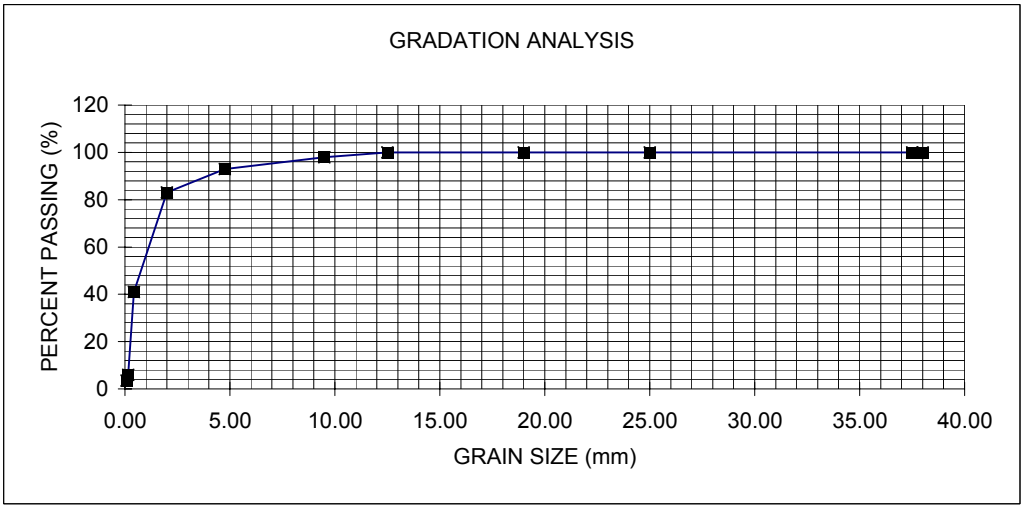
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	98
No. 4	93
No. 10	83
No. 40	41
No. 80	6
No. 200	3.5

Moisture Content (%): 1.8



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 5'

SAMPLE LOCATION: Slightly SIlty Sand - poorly graded (SM-SP)

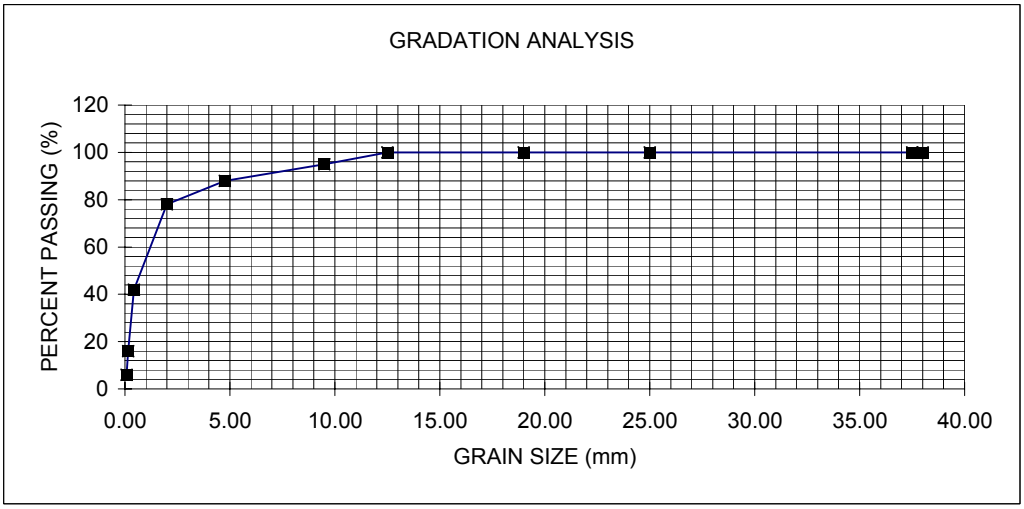
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	95
No. 4	88
No. 10	78
No. 40	42
No. 80	16
No. 200	6.0

Moisture Content (%): 3



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 7.5'

SAMPLE LOCATION: Silty Sand - (SM)

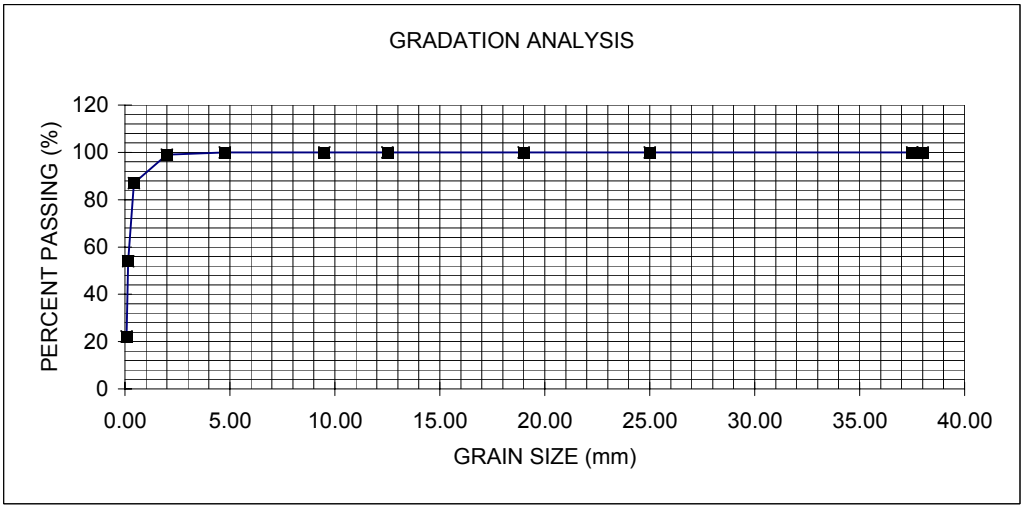
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	100
No. 10	99
No. 40	87
No. 80	54
No. 200	22.2

Moisture Content (%): 3



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 10'

SAMPLE LOCATION: Silty Sand - (SM)

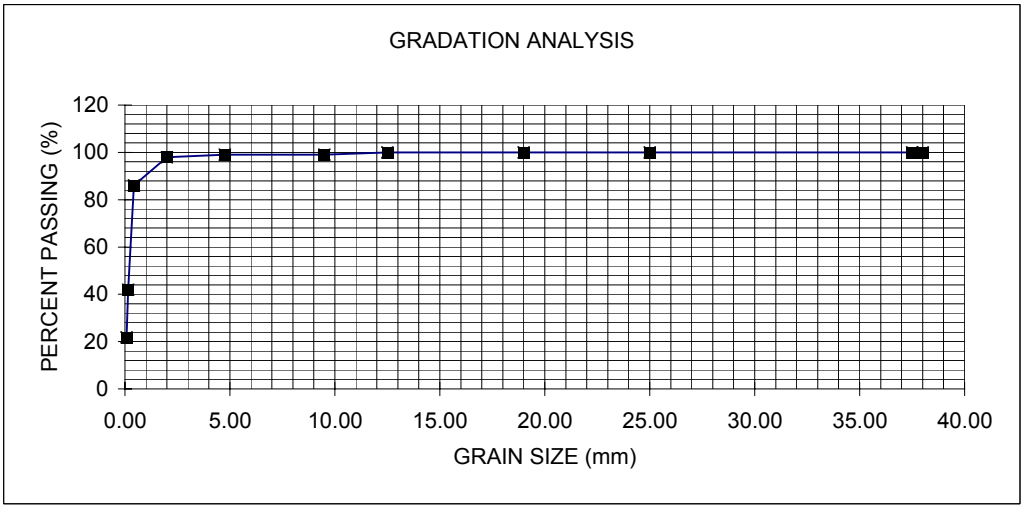
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	99
No. 4	99
No. 10	98
No. 40	86
No. 80	42
No. 200	21.8

Moisture Content (%): 12.9



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 15'

SAMPLE LOCATION: Sand - poorly graded (SP)

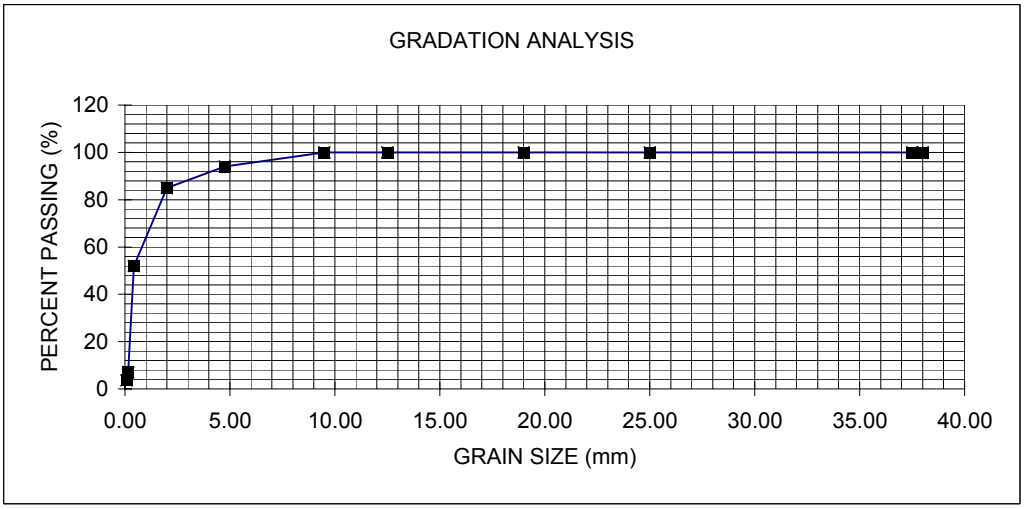
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	94
No. 10	85
No. 40	52
No. 80	7
No. 200	3.7

Moisture Content (%): 3.9



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 17.5'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

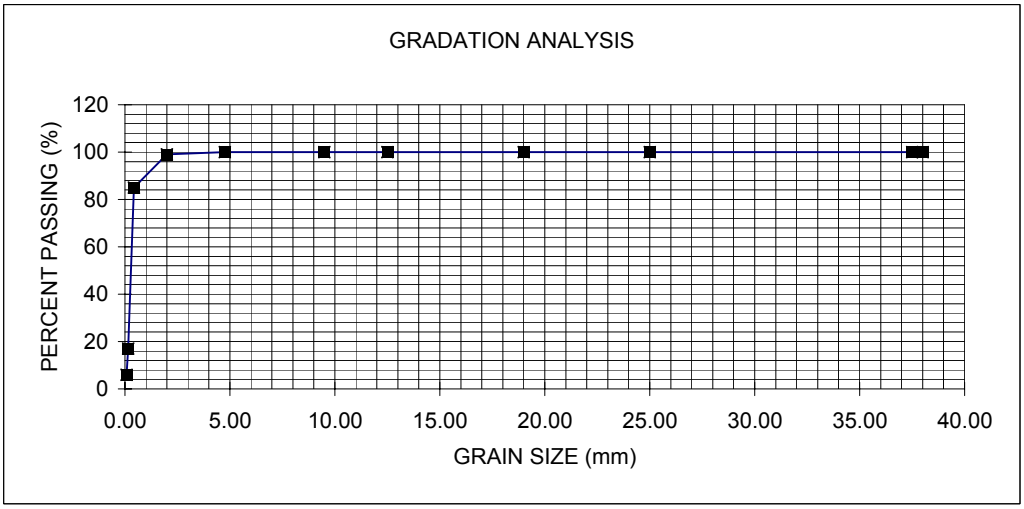
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	100
No. 10	99
No. 40	85
No. 80	17
No. 200	6.0

Moisture Content (%): 5.7



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 20'

SAMPLE LOCATION: Sand - poorly graded (SP)

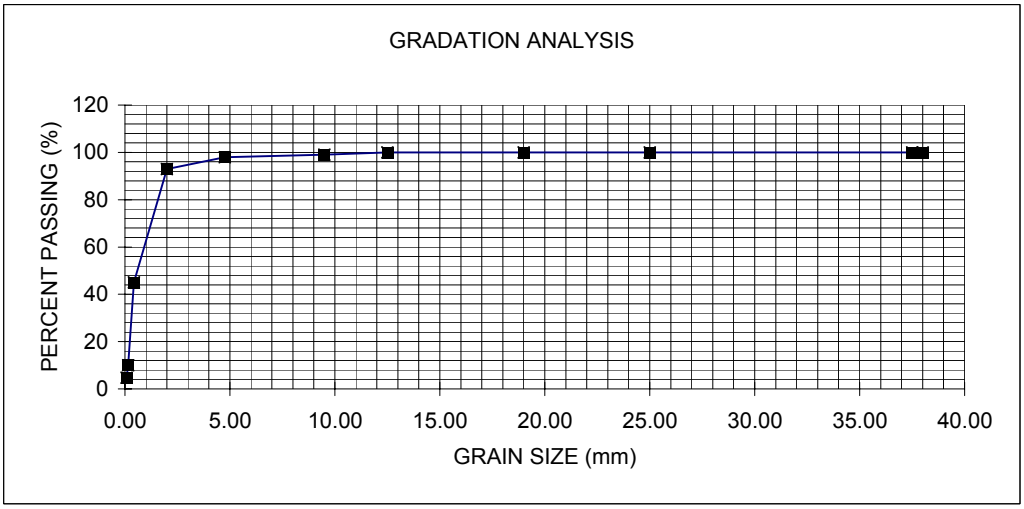
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	99
No. 4	98
No. 10	93
No. 40	45
No. 80	10
No. 200	4.8

Moisture Content (%): 4.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 22.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

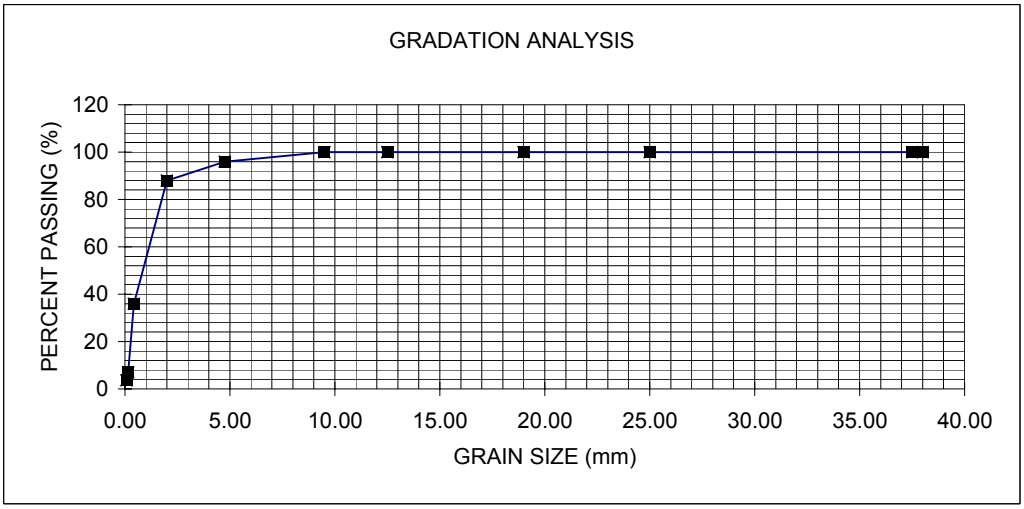
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	96
No. 10	88
No. 40	36
No. 80	7
No. 200	3.6

Moisture Content (%): 5.9



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 4 @ 25'

SAMPLE LOCATION: Sand - poorly graded (SP)

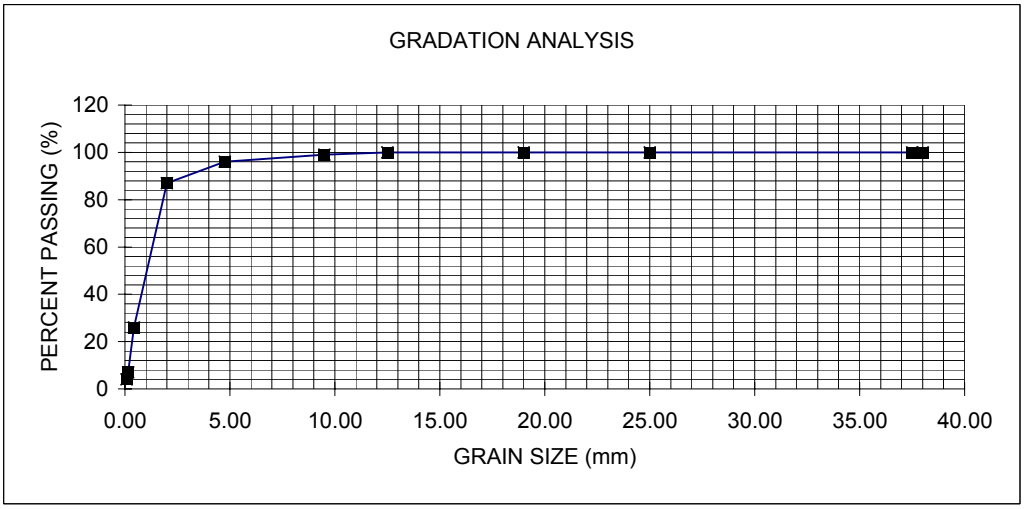
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	99
No. 4	96
No. 10	87
No. 40	26
No. 80	7
No. 200	4.0

Moisture Content (%): 7.4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 2.5'

SAMPLE LOCATION: Silty Sand - (SM)

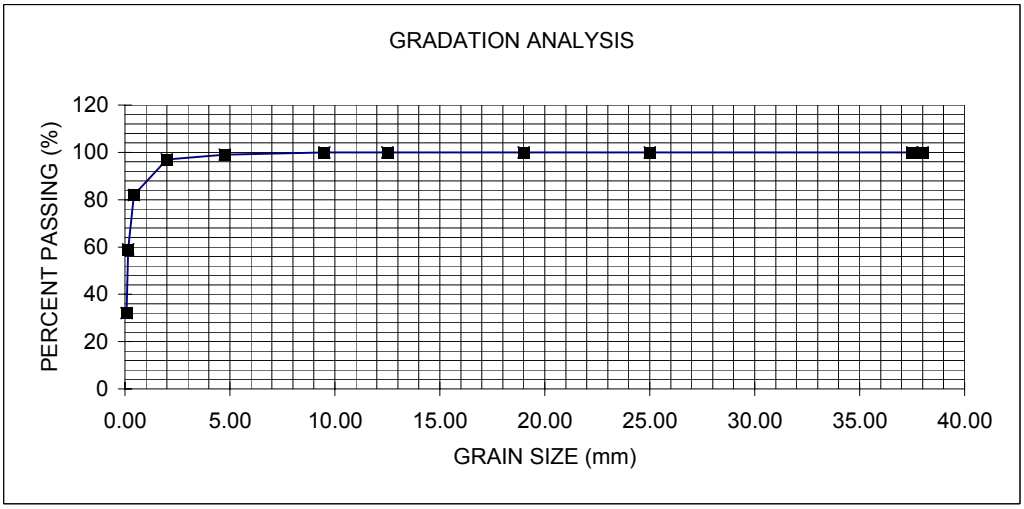
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	99
No. 10	97
No. 40	82
No. 80	59
No. 200	32.0

Moisture Content (%): 7.6



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 5'

SAMPLE LOCATION: Clayey Sand - (SC)

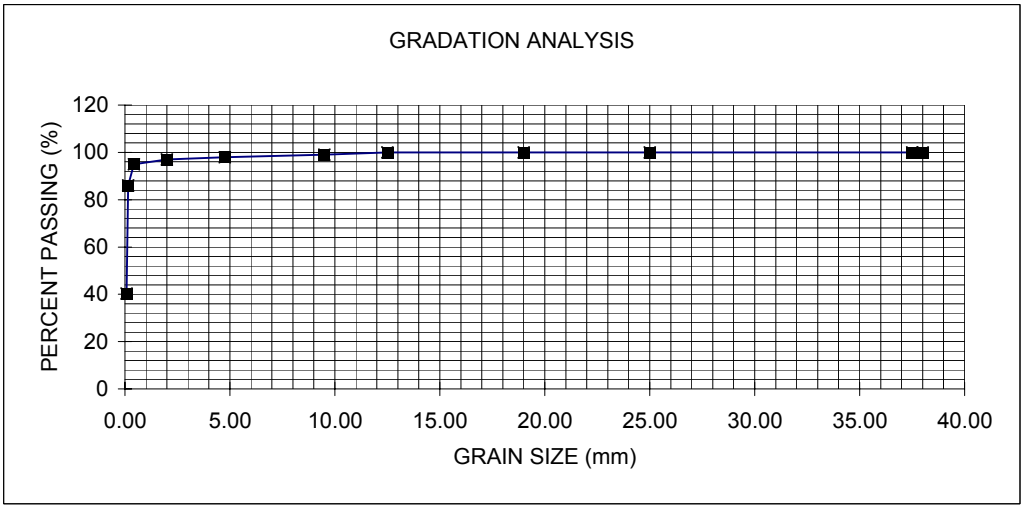
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	19
Plasticity Index:	8

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	99
No. 4	98
No. 10	97
No. 40	95
No. 80	86
No. 200	40.3

Moisture Content (%): 9.1



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 7.5'

SAMPLE LOCATION: Silty Sand - (SM)

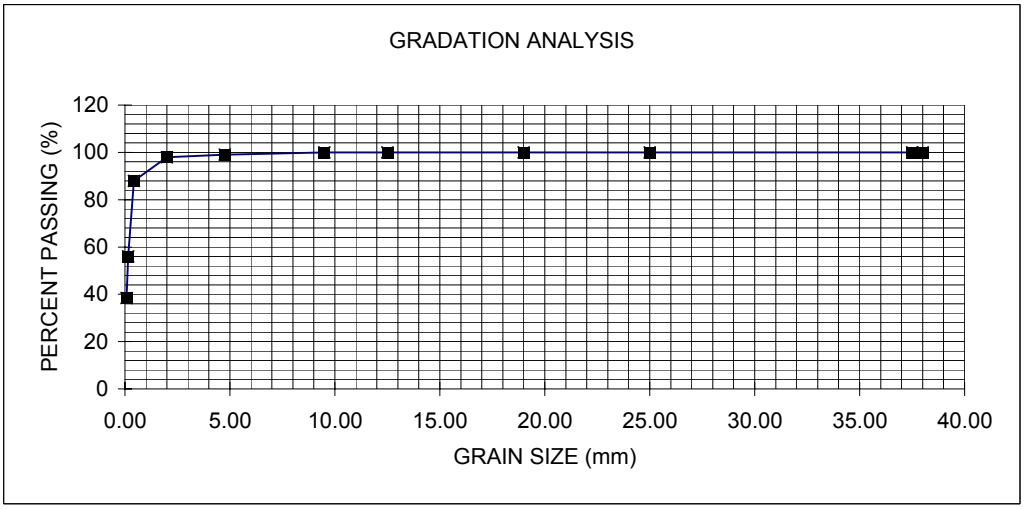
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	99
No. 10	98
No. 40	88
No. 80	56
No. 200	38.4

Moisture Content (%): 14.7



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 10'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

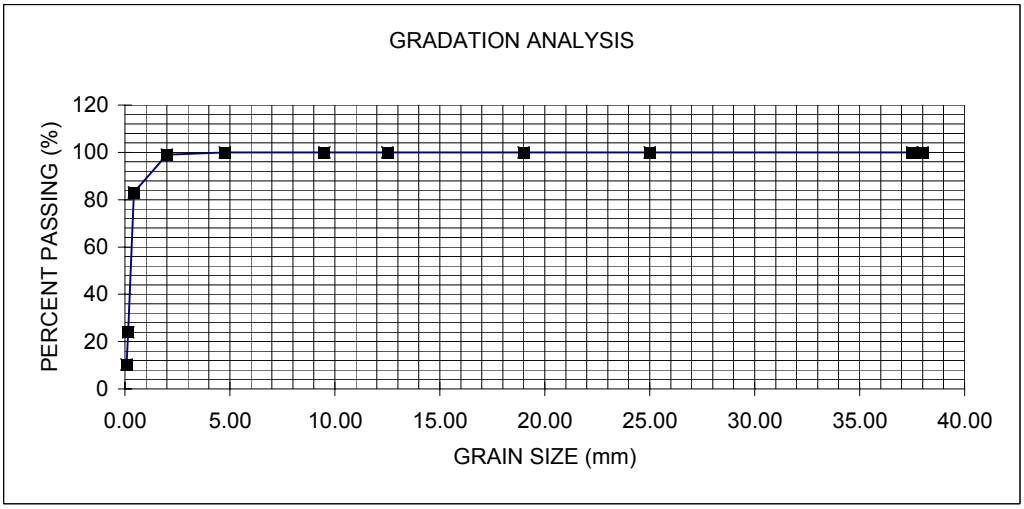
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	100
No. 4	100
No. 10	99
No. 40	83
No. 80	24
No. 200	10.3

Moisture Content (%): 4.4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 12.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

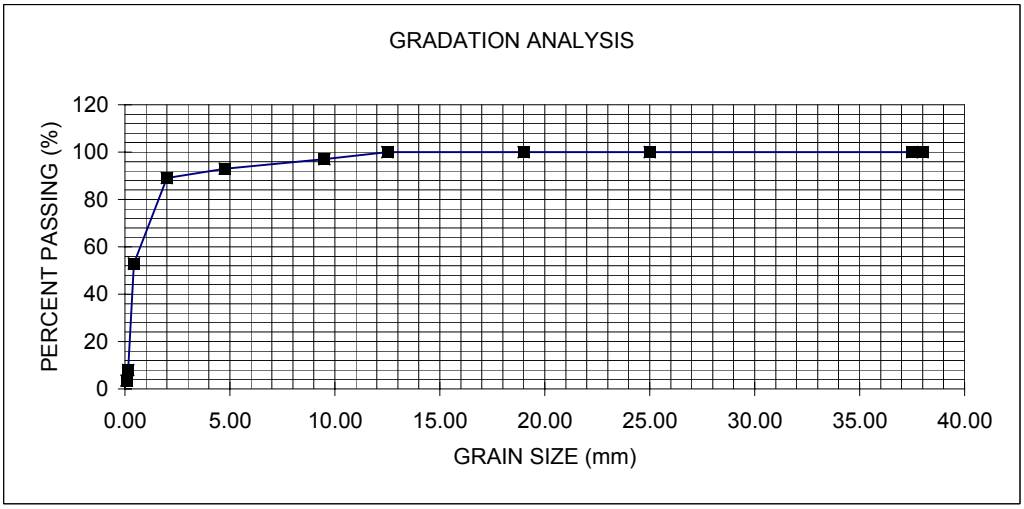
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
1/2"	100
3/8"	97
No. 4	93
No. 10	89
No. 40	53
No. 80	8
No. 200	3.5

Moisture Content (%): 4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 15'

SAMPLE LOCATION: Sand - poorly graded (SP)

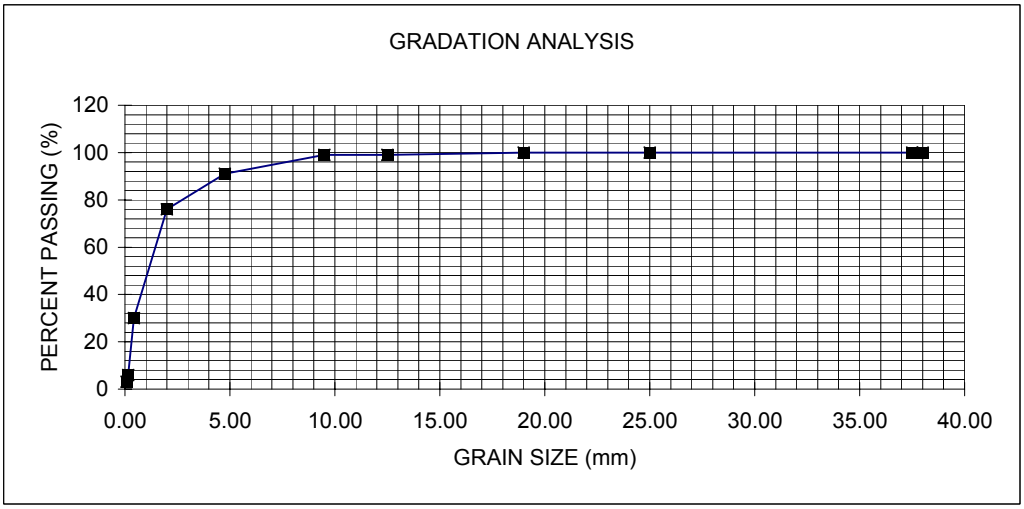
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	99
3/8"	99
No. 4	91
No. 10	76
No. 40	30
No. 80	6
No. 200	3.1

Moisture Content (%): 4



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 17.5'

SAMPLE LOCATION: Sand - poorly graded (SP)

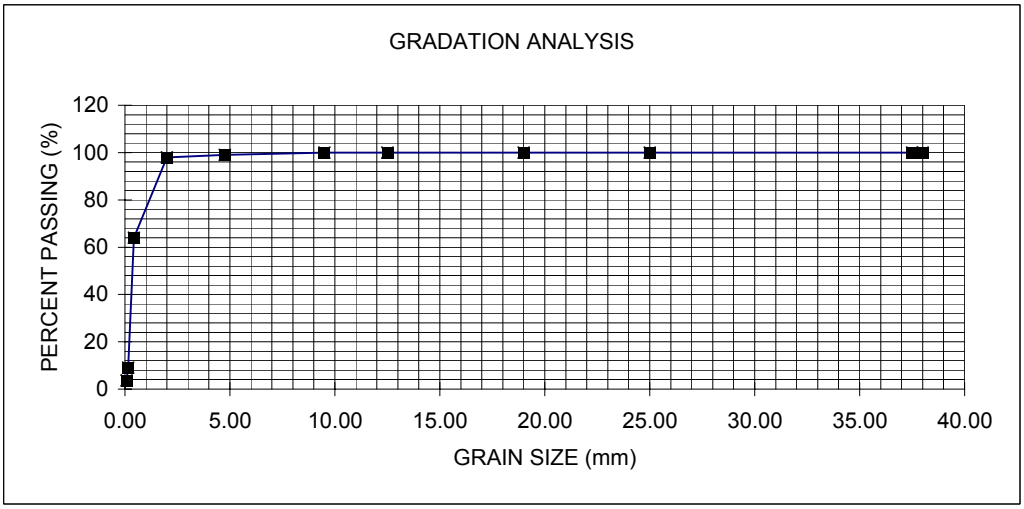
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	99
No. 10	98
No. 40	64
No. 80	9
No. 200	3.6

Moisture Content (%): 4.5



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 20'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

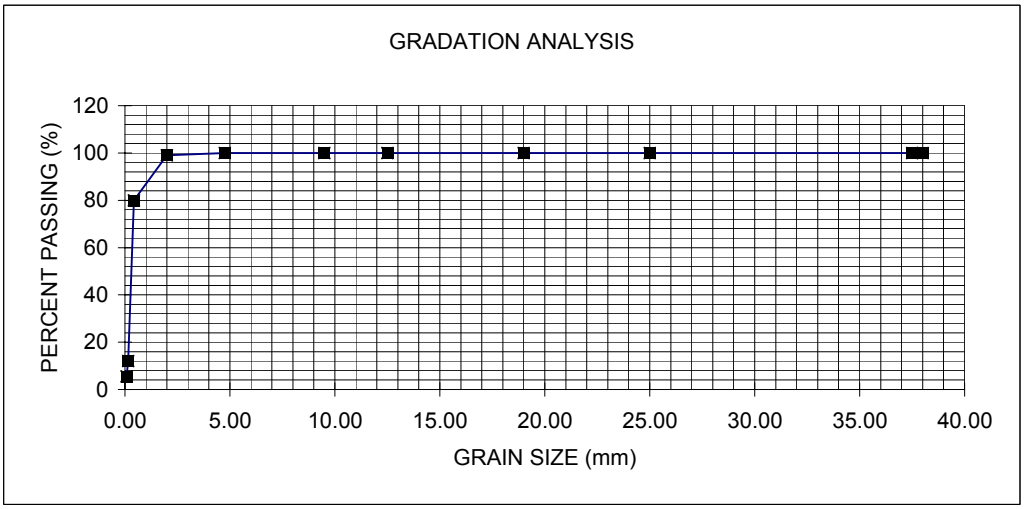
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
No. 4	100
No. 10	99
No. 40	80
No. 80	12
No. 200	5.5

Moisture Content (%): 6.3



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 22.5'

SAMPLE LOCATION: Sand - poorly graded

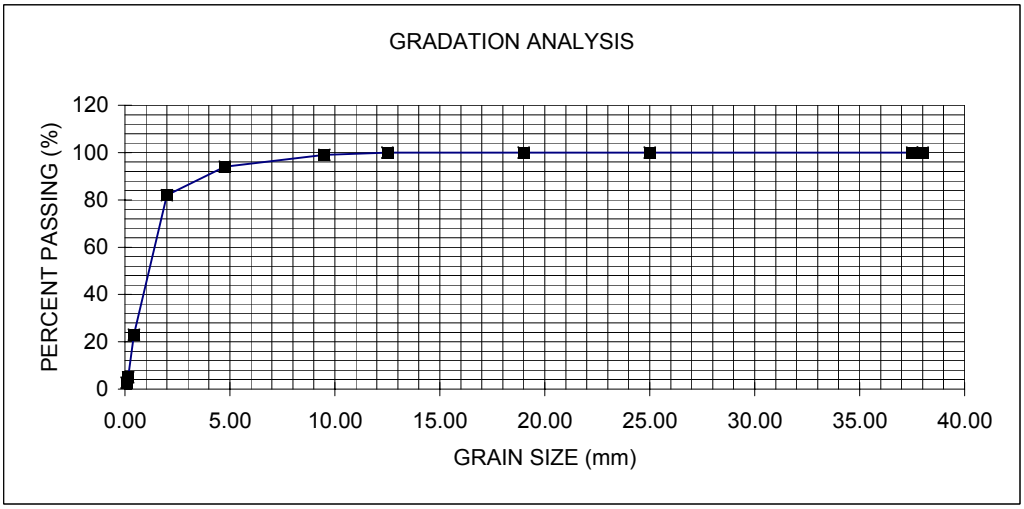
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	94
No. 10	82
No. 40	23
No. 80	5
No. 200	2.7

Moisture Content (%): 4.6



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 5 @ 25'

SAMPLE LOCATION: Sand - poorly graded

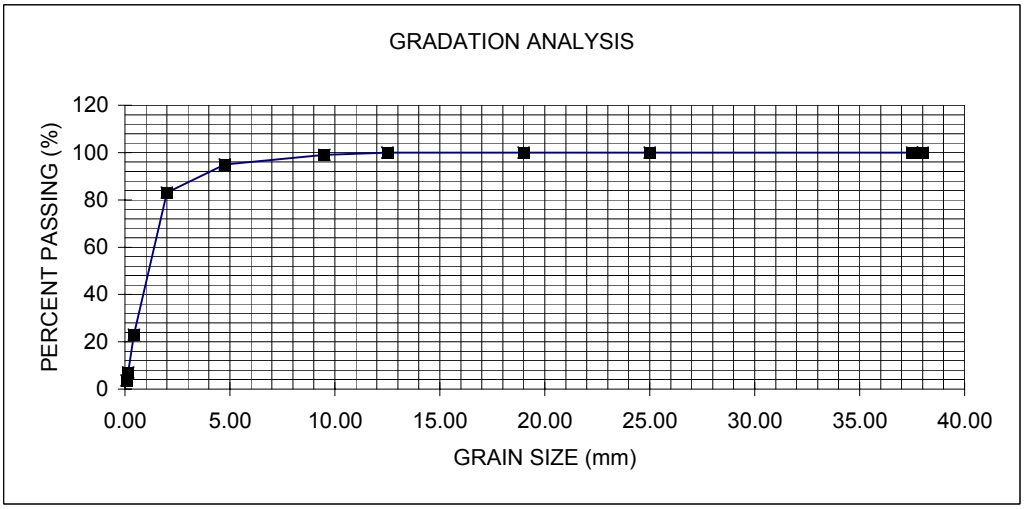
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	95
No. 10	83
No. 40	23
No. 80	7
No. 200	3.6

Moisture Content (%): 5.1



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 6 @ 2.5'

SAMPLE LOCATION: Silty Sand - (SM)

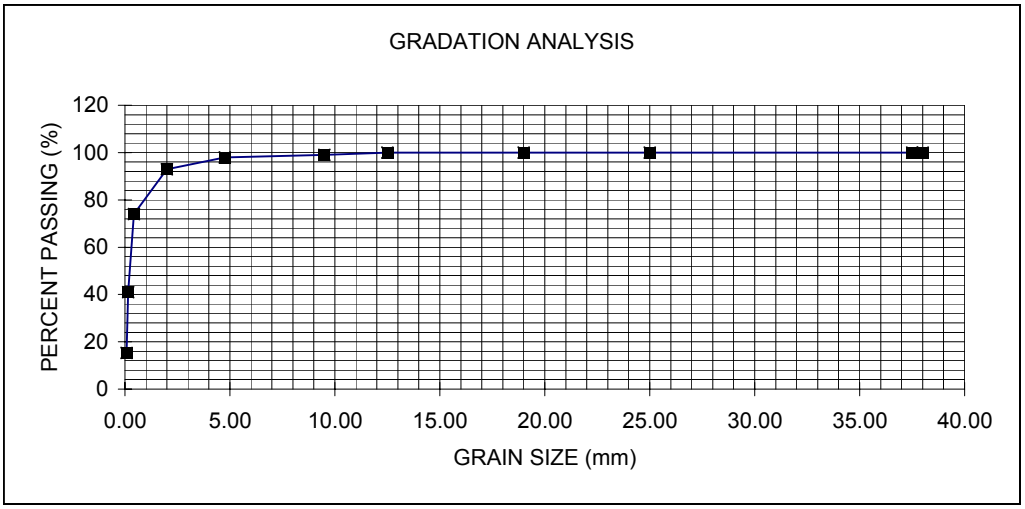
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	98
No. 10	93
No. 40	74
No. 80	41
No. 200	15.3

Moisture Content (%): 7.5



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 6 @ 5'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

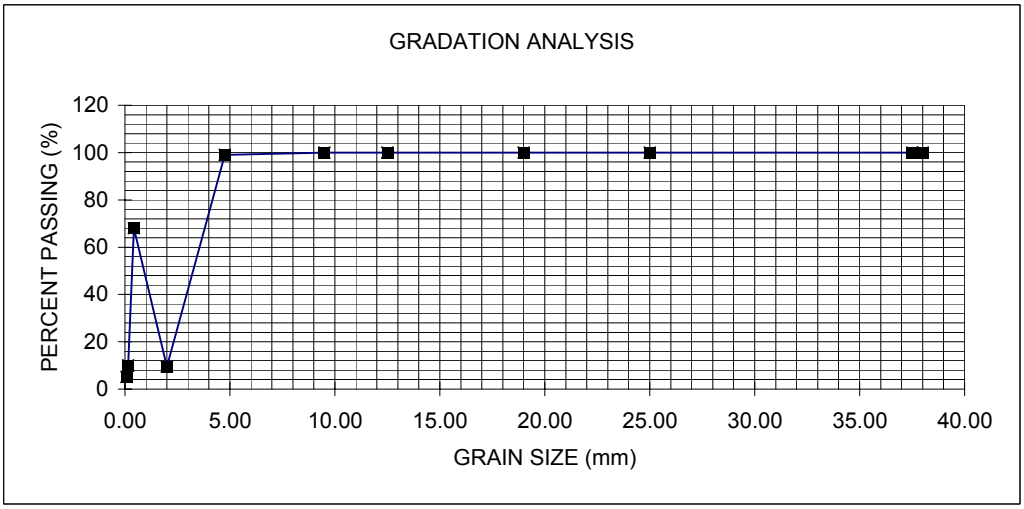
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	100
No. 4	99
No. 10	95
No. 40	68
No. 80	10
No. 200	5.1

Moisture Content (%): 6.9



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 6 @ 7.5'

SAMPLE LOCATION: Slightly Silty Sand - poorly graded (SM-SP)

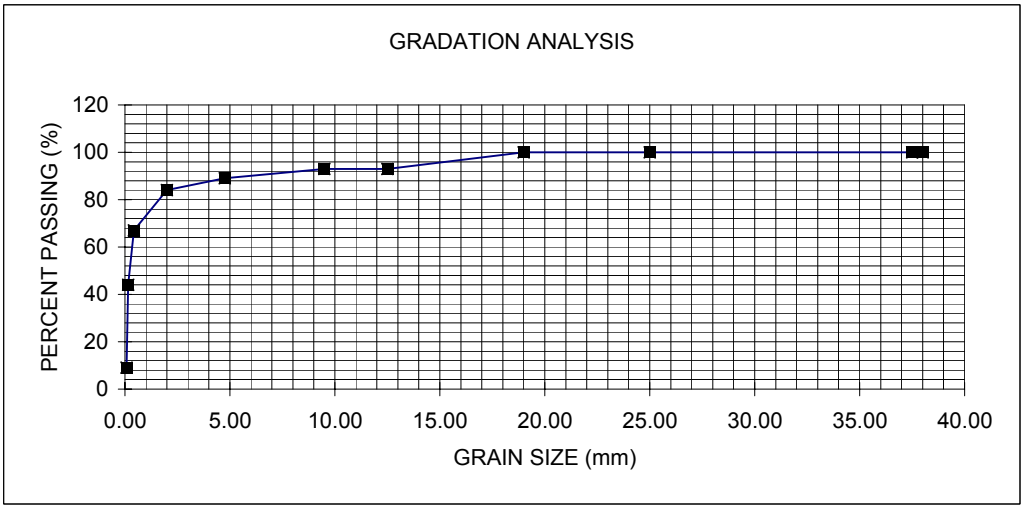
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	93
3/8"	93
No. 4	89
No. 10	84
No. 40	67
No. 80	44
No. 200	9.0

Moisture Content (%): 4.2



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

Addressee: (2)

July 29, 2002

Department of the Army
Albuquerque District Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109

Project No. 6-20507

PROJECT: KAFB

SAMPLE LOCATION: AH 6 @ 10'

SAMPLE LOCATION: Silty Sand - (SM)

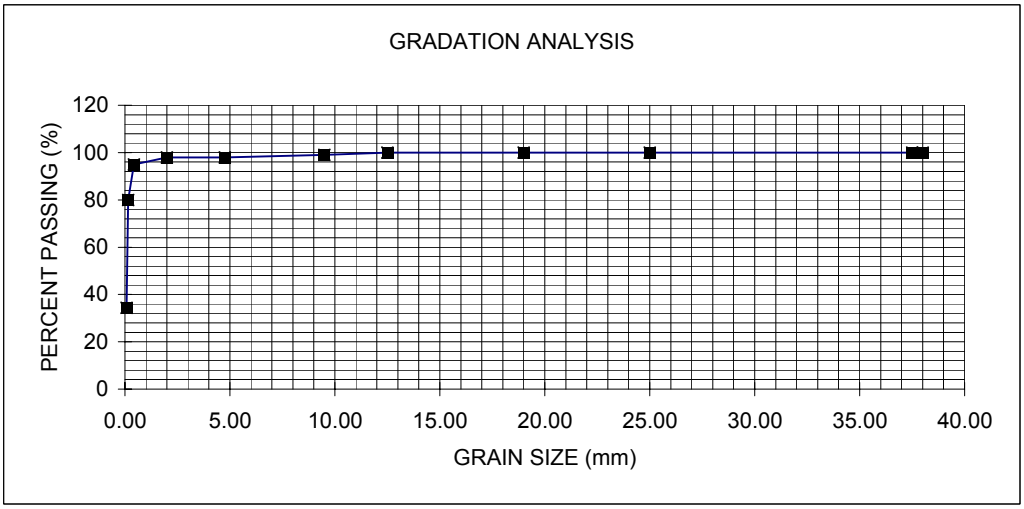
ATTERBERG LIMITS (ASTM D-4318)

Liquid Limit	NV
Plasticity Index:	NP

SIEVE ANALYSIS (ASTM D-422)(Material Retained on .075mm)

Sieve size	Percent Passing
3/4"	100
1/2"	100
3/8"	99
No. 4	98
No. 10	98
No. 40	95
No. 80	80
No. 200	34.3

Moisture Content (%): 9.1



Respectfully Submitted:
GEO-TEST, INC.

Tim Byres, SET

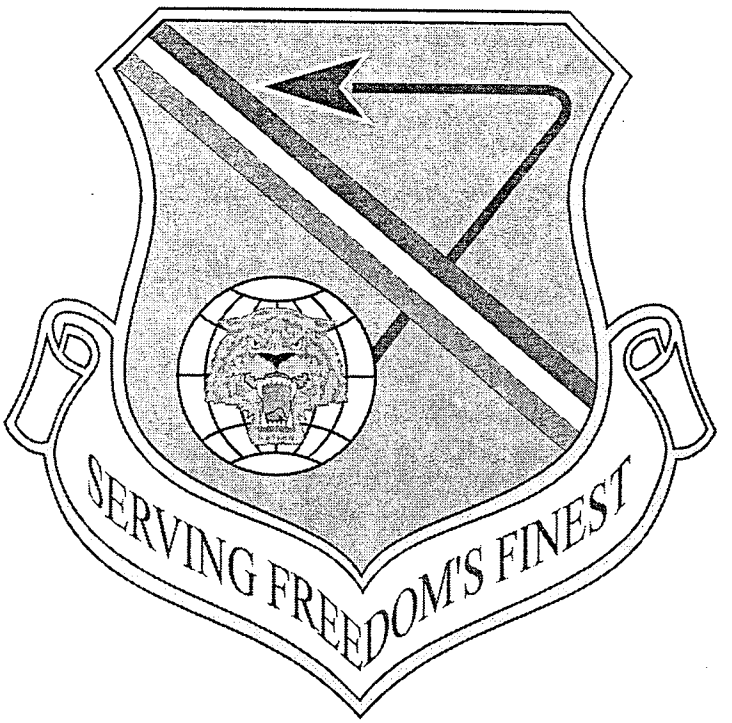
Addressee: (2)

APPENDIX P

FINAL ENVIRONMENTAL ASSESSMENT FOR KIRTLAND AIR FORCE BASE SEWER LINE PROJECT AND FIRING RANGE RENOVATION

FINAL

ENVIRONMENTAL ASSESSMENT FOR KIRTLAND AIR FORCE BASE SEWER LINE PROJECT AND FIRING RANGE RENOVATION



December 1999

Prepared for
377th Air Base Wing Air Force Materiel Command

LIST OF ACRONYMS AND ABBREVIATIONS

ABW	Air Base Wing
ADT	average daily traffic
AFB	Air Force Base
AFI	Air Force Instruction
ARMS	Archaeological Records Management System
ca	circa
CAA	Clean Air Act
CAPD	City of Albuquerque Planning Department
CAWCO	City of Albuquerque Water Conservation Office
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMS	Corrective Measure Study
CO	carbon monoxide
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibel scale
DNL	A day-night average sound level
DoD	Department of Defense
DOE	Department of Energy
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EA	Environmental Assessment
EBI	Effective Buying Income
EIAP	Environmental Impact Assessment Process
EPA	US Environmental Protection Agency
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FICON	Federal Interagency Committee on Noise
ft	feet
FY	fiscal year
gpd	gallons per day
HUD	US Department of Housing and Urban Development
IRP	Installation Restoration Program
LA	Laboratory of Anthropology
LF	Land Fill
LOS	Level of Service
m	meter
MSA	metropolitan statistical area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFA	No Further Action
NHPA	National Historic Preservation Act
NMAAQS	New Mexico Ambient Air Quality Standards
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMEMNRD	New Mexico Energy, Minerals, and Natural Resources Department
NMNHP	New Mexico Natural Heritage Program
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
Pb	lead
PM_{10}	particulate matter equal to or less than ten microns in diameter
POL	petroleum, oils, and lubricants
ppm	parts per million
PSD	Prevention of Significant Deterioration
QD	quantity-distance
RCRA	Resource, Conservation, and Recovery Act
RPZ	runway protection zone
SIP	State Implementation Plan
SO_2	sulfur dioxide
$\mu g/m^3$	micrograms per cubic meter
US	United States
USACE	US Army Corps of Engineers
USAF	US Air Force
USC	US Code
USDA	US Department of Agriculture
USDC	US Department of Commerce
USFS	U.S. Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
V/C	volume-to-capacity
VOC	volatile organic compound

FINDING OF NO SIGNIFICANT IMPACT

PROPOSED SEWER LINE PROJECT AND FIRING RANGE RENOVATION AT KIRTLAND AIR FORCE BASE, NEW MEXICO

The attached Environmental Assessment (EA) was prepared by the 377th Air Base Wing (377 ABW) of Air Force Materiel Command to assess the environmental consequences of the proposed sewer line project and small arms and rife range renovation at Kirtland Air Force Base (AFB). The Department of the Air Force has independently evaluated this EA and adopts it herein.

DESCRIPTION OF THE PROPOSED ACTIONS AND ALTERNATIVES

Proposed Actions. The 377 ABW at Kirtland AFB proposes to upgrade existing facilities to meet current and future base and personnel requirements. The proposed actions are to: (1) remove or abandon in place the existing septic system in the 600 and 700 areas and replace it with a sanitary sewer system, and (2) rehabilitate the small arms and rifle range to make Buildings 707 and 709 compliant with current building codes and remove lead contamination.

Alternatives. The alternative to the proposed sewer line project is to replace the septic system in the 600 and 700 areas with new septic systems, thus extending the life of the system. The new sanitary sewer line would not be installed. The alternative to the proposed small arms and rifle range renovation is to train personnel at the M-60 Range in the withdrawn area of the base. The proposed small arms and rifle range facility renovation would not occur. The small arms and rifle range would be closed and a project to remove existing lead and restore the site would be initiated.

No-Action Alternative. The No-Action Alternative is to leave the existing septic systems in place and not renovate the small arms and rifle range facility. Under this alternative the existing septic tanks may have to be downgraded to holding tanks which would require regular monitoring and pumping when they become full. The No-Action Alternative for the firing range would mean that it would continue to deteriorate to a point that the facility would be closed and a project to clean up and restore the site would be initiated.

SUMMARY OF ANTICIPATED ENVIRONMENTAL EFFECTS

Proposed Actions. Implementation of the proposed actions could result in minor short-term negative impacts to air quality, noise, soils, vegetation, wildlife, and transportation from construction-related activities. There is a slight potential for minor long-term impacts to cultural resources from trenching activities required for installation of the new sewer line. Beneficial impacts are expected to occur to human health and safety, and socioeconomics from both proposed actions. No negative impacts are expected to health and safety of children, current land uses, water resources or floodplains, wetlands, sensitive species, visual resources, minority and low-income populations, or hazardous waste generation from the proposed actions.

Alternatives. Implementation of the M-60 Range alternative is not expected to result in additional negative impacts to sensitive species. Cultural resources are not expected to be negatively affected by either alternative. If the alternatives were implemented, the new septic system could still be a source of inadvertent contamination of the environment from chemicals used in the 600 and 700 buildings, and the beneficial effect to human health and safety of upgrading facilities and removing lead contamination at the small arms and rifle range would not occur.

Human Health and Safety. Beneficial impacts to human health and safety are expected to result from the sewer line proposed action or the septic system replacement alternative by improving and extending the life of the wastewater disposal system in the area. Beneficial impact from removal of lead from the existing range and improvement of the range infrastructure would occur from the range renovation proposal. No negative impacts are expected to health and safety of children since the projects occur in areas where children are not allowed.

Air Quality. Implementation of the sewer line proposed action, the small arms and rifle range proposed actions or the septic system replacement alternative could result in short-term negative impacts to carbon monoxide and particulate emissions from construction-related activities. The M-60 Range alternative would have no air quality impacts other than from transporting personnel to the range.

Noise. Implementation of the proposed actions or the septic system replacement alternative could result in short-term, minor impacts to noise from construction-related activities. The M-60 Range alternative would increase the frequency of the gunfire at that site.

Land Use. No negative impacts are expected to current land uses from the proposed actions or the septic system replacement alternative because land use would remain unchanged by these actions. The M-60 Range is currently used for multiple activities including a variety of training exercises and horseback riding. Increased use of the range could cause conflicts among current users and would have to be resolved by committee, but would cause no change in land use.

Geologic Resources. Implementation of the proposed actions or the septic system replacement alternative could result in short-term negative impacts to soils from construction-related activities, including installation of the sewer system.

Water Resources. No negative impacts are expected to water resources from the proposed actions or the septic system replacement alternative because impacts from soil disturbing activities that could contribute to sedimentation of local waterways would be minimized by using best management practices to reduce erosion by wind and water. No floodplains would be affected by the proposed actions or alternatives. The M-60 Range alternative would have no effect on water resources.

Biological Resources. Implementation of the proposed actions or the septic system replacement alternative could result in short-term negative impacts to vegetation and wildlife from construction-related activities. No negative impacts are expected to

wetlands from the proposed actions or any alternative. The M-60 Range is located in or near potential habitat of three state or federally listed bird species. However, it is expected that these birds have either acclimated to the sound of gunfire or have moved away from the range so that increased use of the range would have no effect on the survivability of these species.

Transportation and Circulation. Implementation of the proposed actions could result in short-term negative impacts to on-base transportation from hauling construction and renovation-related debris to the landfill from either proposed action or the septic system replacement alternative. The bussing required by the M-60 Range alternative would have negligible impacts to traffic on the base.

Visual Resources. No negative impacts are expected to visual resources from the proposed actions because no changes would occur to the visual environment. The new sewer line or septic system would be located underground, and the firing range facilities would remain consistent with the current appearance of this area.

Cultural Resources. No known significant cultural resources, historic or prehistoric, exist within the proposed project boundaries on the base, so no impacts to cultural resources are expected to occur. However, a sandy rise is located south of Southgate Avenue and east of Cell Drive that is relatively undisturbed and has a potential for buried cultural resources. This area should be monitored by a qualified archaeologist during the trenching/excavation activities associated with installation of the new sanitary sewer line. If cultural deposits are encountered, work should stop for its evaluation. The off-base portion of the sewer line crosses a site that is potentially eligible for the National Register of Historic Places.

Socioeconomics. Beneficial socioeconomic effects from the proposed actions or from the septic system replacement alternative would be short-term in nature and would result from the purchases of construction materials, salaries paid to construction workers, and contracts for construction equipment from the surrounding community. The M-60 Range alternative would have no effect on socioeconomics. No negative impacts are expected to minority or low-income populations from the proposed actions or alternatives because none of the proposals will affect these populations off the base.

Environmental Management. Minor amounts of hazardous waste would occur from the proposed actions or alternatives, but any work that is generated will be handled in accordance with base management polices. Albuquerque wastewater treatment works has more than enough capacity for the additional wastewater that would be delivered by the new sewer. Installation Restoration Program sites in the vicinity of the project areas will be handled in accordance with the rules and regulations governing these concerns. Lead and asbestos removed from the firing range would be handled according to regulations, as would the septic tanks if they are found to be contaminated with any hazardous substance. Additional spent lead rounds would be added to the M-60 Range, if this alternative were selected, and would have to be managed and cleaned up in the future.

No-Action Alternative. Selection of the No-Action alternative could result in a conversion of the septic tanks to holding tank status. The septic system would continue to be a possible source of contamination to the environment from chemicals used in the 600 and 700 facilities. The small arms and rifle range facility would continue to need baffle and backstop upgrades for human health and safety reasons, lead contamination would continue to accumulate on the range. The expected usefulness of the range would be only about three more years. After three years, the facility would be closed and a project to remove the lead and restore the site would be initiated.

CONCLUSION

After careful review of the EA of the proposed actions, I have concluded that the proposed actions would not have a significant impact on the quality of the human environment. Therefore an issuance of a Finding of No Significant Impact is warranted, no environmental impact statement will be prepared. This analysis fulfills the requirements of the National Environmental Policy Act, the President's Council on Environmental Quality regulations, Department of Defense Directive 6050.1, and Air Force Instruction 32-7061.

Accepted By: _____ Date: 3 JAN 00
CYNTHIA L. GOOCH, GS-12
Chief, Environmental Quality Program

Approved By: _____ Date: 3 Jan 00
CHRISTOPHER B. DEWITT, RPG, GS-14
Chief, Environmental Planning Function
Environmental Management Division

F I N A L

ENVIRONMENTAL ASSESSMENT

FOR

KIRTLAND AIR FORCE BASE SEWER LINE PROJECT AND FIRING RANGE RENOVATION

December 1999

Prepared for
377th Air Base Wing Air Force Materiel Command

EXECUTIVE SUMMARY

The potential impacts on the environment associated with the proposed sewer line project and small arms and rifle range renovation at Kirtland Air Force Base (AFB) are evaluated in this Environmental Assessment prepared for the 377th Air Base Wing (377 ABW) of Air Force Materiel Command.

PURPOSE AND NEED FOR THE ACTIONS

The purpose of the proposed actions is to provide adequate facilities and rehabilitate existing facilities to meet current and future base and personnel requirements. These proposed actions are in response to building code upgrade requirements, hazardous waste management and cleanup requirements, compliance with existing regulations and agreements, and mission requirements.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Proposed Actions

The 377 ABW at Kirtland AFB proposes to rehabilitate and renovate 2 facilities on base. The proposed actions are to:

- Remove or abandon in place the existing septic system in the 600 and 700 areas and replace it with a sanitary sewer main connected to the local sewer intercept; and
- Rehabilitate the small arms and rifle range including associated offices, and classrooms in Bldgs. 707 and 709 to make them compliant with current building codes, improve stormwater management, and reduce lead contamination. This could include the demolition of Buildings 707 and 709 and the construction of a new one to replace them.

Alternatives

Sewer Line Project. The alternative to the proposed new sewer line is to replace the existing septic system in the 600 and 700 areas with new septic systems in order to reduce the risk of contamination from the existing tanks. The new sewer line would not be installed if this alternative were implemented.

Small Arms and Rifle Range Renovation. The alternative to the proposed range renovation is to train security and mobility personnel at the M-60 (machine gun) Range that is located approximately 10 miles southeast of the small arms and rifle range in the withdrawn area of the base. The renovation of the existing small arms and rifle range facility would not occur. The facility would be closed and a project to remove lead contamination and restore the site would be initiated.

No-Action Alternative

The No-Action Alternative is to leave the existing septic systems in place and not renovate the small arms and rifle range. Under this alternative, the facilities would continue to deteriorate. These facilities are reaching the end of their life span. If the septic leach fields become plugged, the tanks would then be downgraded to holding tanks which must be regularly pumped and checked by the state. The small arms and rifle range has only about 3 years of useful life left before the backstop becomes too saturated with lead rounds to be effective. In addition, the baffles are not compliant with current building codes and will not safely handle new ammunition. Facility closure, clean up, and site restoration would be initiated when the range is closed.

SUMMARY OF ANTICIPATED ENVIRONMENTAL EFFECTS

Proposed Actions

Implementation of the proposed actions could result in minor short-term negative impacts to air quality, noise, soils, vegetation, wildlife, and transportation from construction-related activities. Minor long-term impacts to cultural resources could occur from trenching activities associated with the sewer line project. Beneficial impacts are expected to occur to human health and safety, and socioeconomics. No negative impacts are expected to current land uses, water resources or floodplains, wetlands, sensitive species, visual resources, minority and low-income populations, or hazardous waste generation from the proposed actions. No increase in environmental health or safety risks to children are expected.

Alternatives

Implementation of the M-60 Range alternative is not expected to result in additional negative impacts to sensitive species. Cultural resources are not expected to be negatively effected by either alternative. The beneficial effect to human health and safety of upgrading and clearing the lead contamination in the small arms and rifle range proposed action would not occur for several years, and the new septic system could still be a source of inadvertent contamination of the environment from chemicals used in the 600 and 700 facilities.

Human Health and Safety. Beneficial impacts to human health and safety are expected to result from the new sewer line or the septic system replacement alternative by improving and extending the life of the wastewater disposal system in the 600 and 700 areas on the base. Beneficial impacts from the small arms and rifle range renovation would result from the removal of lead from the range and improvement of the facilities. No increase in environmental health and safety risks to children are expected since none of the projects occur in areas where children are allowed.

Air Quality. Implementation of the sewer line proposed action, the small arms and rifle range proposed action, or the septic system replacement alternative could result in short-term negative impacts to carbon monoxide and particulate matter levels from construction-related activities. The M-60 Range alternative would not have air quality impacts other than bussing personnel to the range.

Noise. Implementation of the proposed actions or the septic system replacement alternative could result in short-term, minor impacts to noise from construction-related activities. The M-60 Range alternative would increase the frequency of gunfire at that site.

Land Use. No negative impacts are expected to current land uses from the proposed actions or the septic system replacement alternative because the land uses would remain unchanged by these actions. Increased use of the M-60 Range could cause conflict with other potential users and would have to be resolved by committee, although land use would not be affected.

Geologic Resources. Implementation of the proposed actions or the septic system replacement alternative could result in short-term negative impacts to soils from construction-related activities, including installation of the sewer system.

Water Resources. No negative impacts are expected to water resources from the proposed actions or the septic system replacement alternative because sedimentation of local waterways would be minimized by using best management practices. No floodplains would be affected by the proposed actions or alternatives. The M-60 Range alternative would have no effect on water resources.

Biological Resources. Implementation of the proposed actions or the septic system replacement alternative could result in short-term negative impacts to vegetation and wildlife from construction-related activities. No negative impacts are expected to wetlands from the proposed actions or any alternatives. The M-60 Range is located in or near potential habitat of three state or federally listed bird species. However, implementation of that alternative is not expected to affect these birds because it is an existing firing range so any individuals in the area would either have acclimated to the sound of gunfire or have moved away from the area.

Transportation and Circulation. Implementation of the proposed actions or the septic system replacement alternative could result in short-term negative impacts to transportation from construction and renovation-related debris being hauled to the landfill. The bussing required by the M-60 Range alternative would have negligible impacts to traffic on the base.

Visual Resources. No negative impacts are expected to visual resources from the proposed actions or alternatives because no changes would occur to the visual environment. The new sewer line or septic system would be located underground, and the small arms and rifle range facilities would remain consistent with the current appearance of this area.

Cultural Resources. No known significant cultural resources, historic or prehistoric, exist within the proposed project boundaries, so no impacts to

cultural resources are expected to occur. However, a sandy rise is located south of Southgate Avenue and east of Cell Drive that is relatively undisturbed and has a potential for buried cultural resources. This area should be monitored by a qualified archaeologist during the trenching/excavation activities associated with installation of the new sanitary sewer line. If cultural deposits are encountered, work should stop for its evaluation. The off-base portion of the sewer line crosses a site that is potentially eligible for the National Register of Historic Places.

Socioeconomics. Beneficial socioeconomic effects from the proposed actions or from the septic system replacement alternative would be short-term in nature and would result from the purchases of construction materials, salaries paid to construction workers, and contracts for construction equipment from the surrounding community. The M-60 Range alternative would have no effect on socioeconomics. No negative impacts are expected to minority or low-income populations from the proposed actions or alternatives because none of the actions will affect these populations off the base.

Environmental Management. Minor amounts of hazardous waste from the proposed actions or alternatives will be handled in accordance with base management polices. Albuquerque wastewater treatment works has more than enough capacity for the additional wastewater that would be delivered by the new sewer line. Installation Restoration Program sites in the vicinity of the project areas will be handled in accordance with the rules and regulations governing these concerns. The septic tanks, if they are found to be contaminated with any hazardous substance would be handled according to regulations, as would the removal of lead and asbestos from the small arms and rifle range. Additional spent lead rounds would be added to the M-60 Range, if this alternative were selected, and would have to be managed and cleaned up in the future.

No-Action Alternative. Selection of the No-Action Alternative could result in the septic system being converted to holding tank status. The septic system would continue to be a possible source of contamination to the environment from chemicals used in the 600 and 700 facilities. The small arms and rifle range facility would continue to have substandard storm runoff facilities and would

continue to need baffle and backstop upgrades for human health and safety reasons. The expected usefulness of the range would only be about three more years. After three years, the facility would be closed and a project to remove the lead and restore the site would be initiated.

FINAL
ENVIRONMENTAL ASSESSMENT
FOR
SEWER LINE PROJECT AND FIRING RANGE RENOVATION
AT
KIRTLAND AIR FORCE BASE

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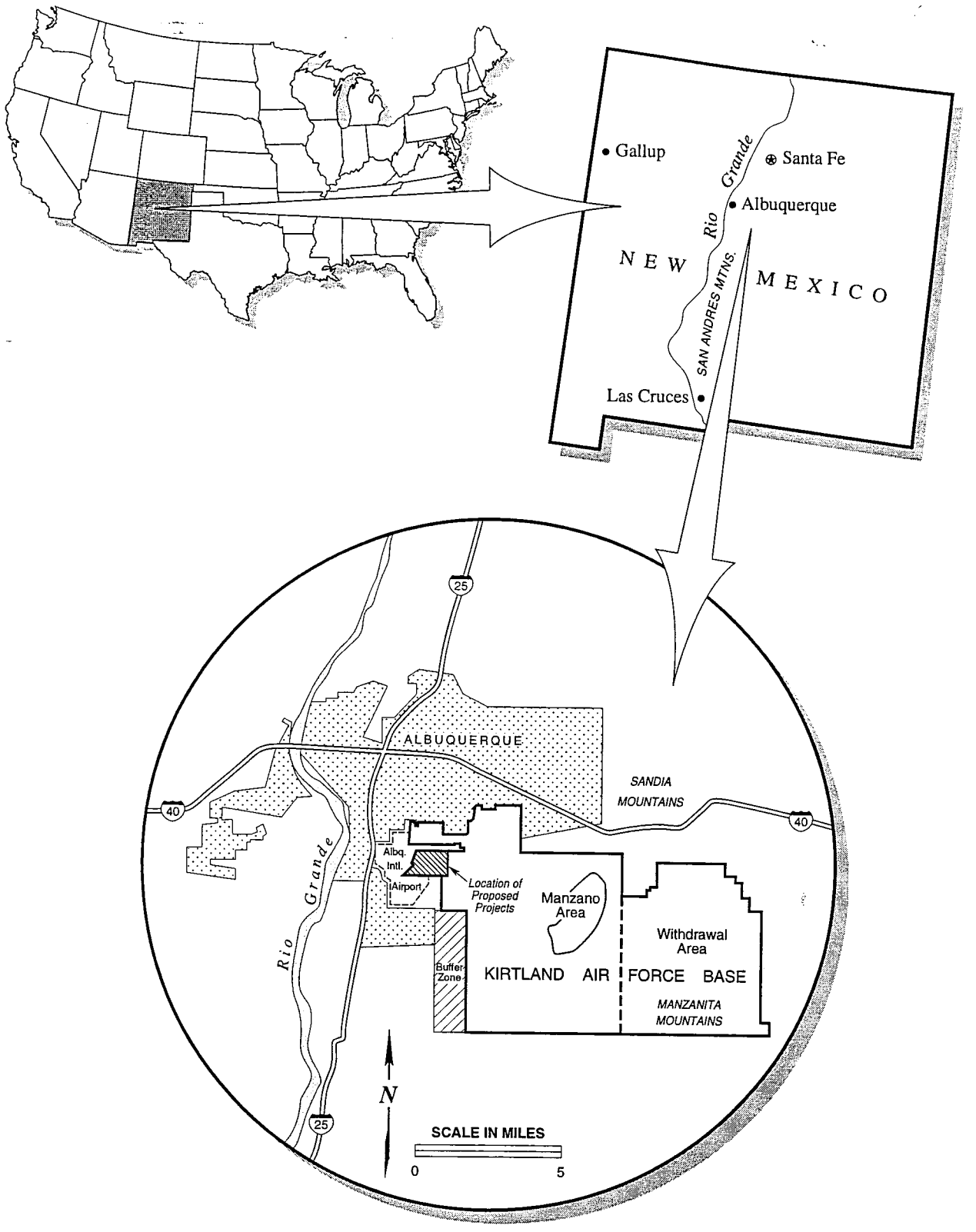
SECTION 1
PURPOSE AND NEED FOR THE PROPOSED ACTIONS

This Environmental Assessment (EA) evaluates the potential impacts on environmental and human resources associated with the installation of a sewer line and the renovation of the small arms and rifle range at Kirtland Air Force Base (AFB) in Albuquerque, New Mexico (the proposed actions). This EA also describes reasonable alternatives to the proposed actions, including the No-Action Alternatives. The EA is part of the Environmental Impact Analysis Process (EIAP) as set forth in Air Force Instruction (AFI) 32-7061, which implements the National Environmental Policy Act (NEPA); the regulations implementing NEPA promulgated by the President's Council on Environmental Quality (CEQ) as Title 40 of the Code of Federal Regulations (CFR) § 1500-1508; and Department of Defense (DoD) Directive 6050.1.

1.1 BACKGROUND

Kirtland AFB is located just southeast of Albuquerque, New Mexico at the foot of the Sandia and Manzanita Mountains (figure 1-1). These mountains rise to over 10,000 feet (ft) and define the eastern boundary of an area locally known as East Mesa. Kirtland AFB encompasses over 52,000 acres of East Mesa with elevations ranging from 5,200 to almost 8,000 ft above mean sea level United States [US] Geological Survey, 1990 a, b, c; 1991 a, b, c). Land use adjacent to the base includes the Cibola National Forest to the northeast and east, the Manzano Wilderness Area and the Isleta Reservation to the south, and residential and business areas of the city of Albuquerque to the west and north.

Kirtland AFB was established in the late 1930s as a training base for the US Army Air Corps. In 1941, construction of permanent barracks, warehouses, and a chapel was completed and a B-18 bomber, Kirtland AFB's first military aircraft, arrived. Troops soon followed, and Kirtland AFB grew rapidly with US involvement in World War II. The base served as a training site for aircrew for many of the country's bomber aircraft, including the B-17, B-18, B-24, and the B-29. After the war, Kirtland AFB shifted from a training facility to a test and evaluation facility for weapons delivery, working closely with both Los Alamos National Laboratory and Sandia Army Base (Sandia National Laboratories).



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Kirtland Air Force Base Location

FIGURE 1-1

Kirtland AFB and its adjoining neighbor to the east, Sandia Army Base, were combined in 1971. The two divisions of the base are still referred to as Kirtland West and Kirtland East, respectively. Kirtland AFB is now operated by the 377th Air Base Wing (377 ABW) of Air Force Materiel Command.

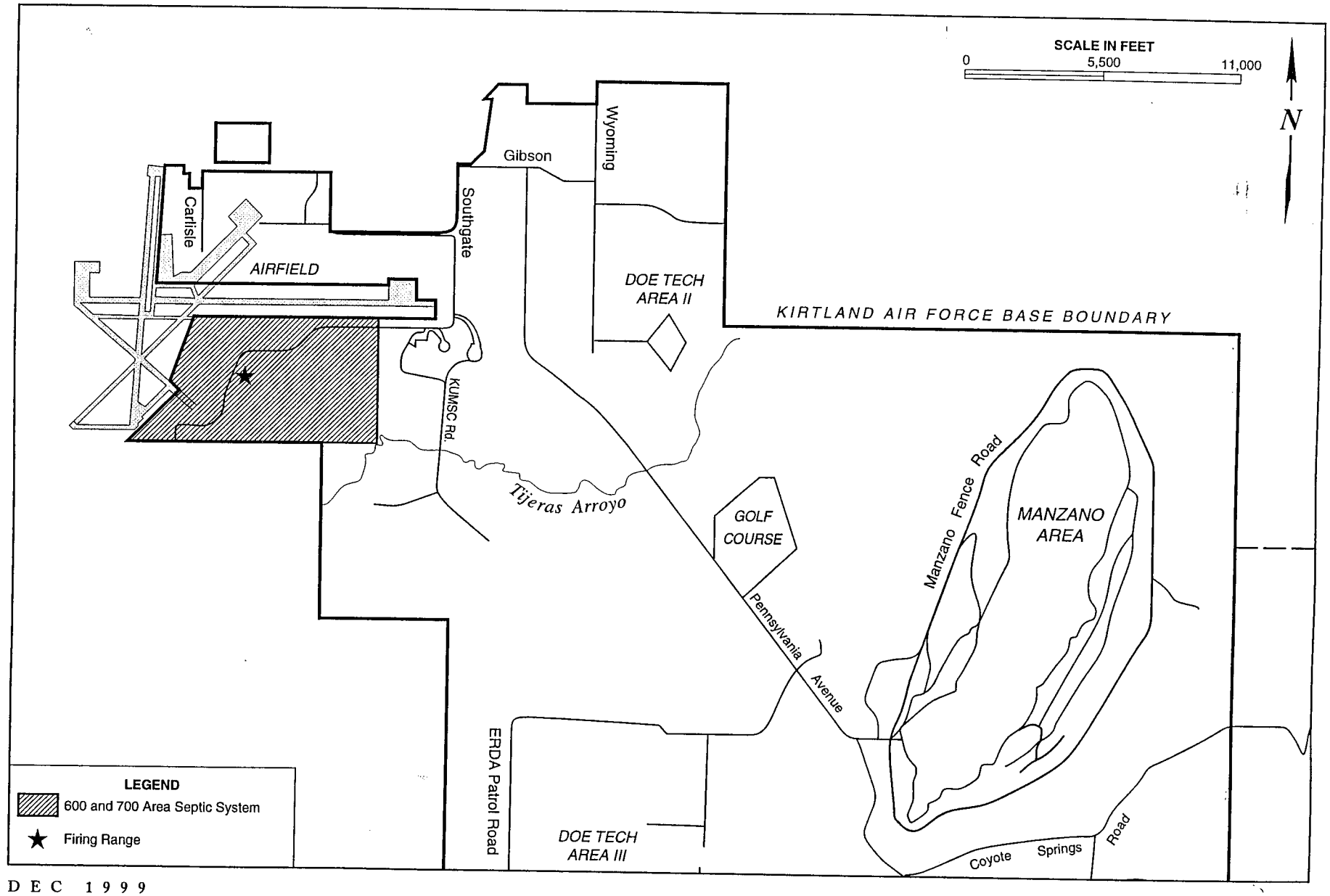
The 377 ABW's prime mission, as the host unit at Kirtland AFB, is munitions maintenance, readiness, and base operating support for approximately 200 associate organizations with personnel, resources, equipment, and facilities. The 377 ABW provides fire protection (including crash and rescue) for Albuquerque International Sunport.

Kirtland AFB serves as a center for research and development for Air Force Research Laboratory and Sandia National Laboratories. The base functions as a test and evaluation center for the Space and Missile System Center and Air Force Operational Test and Evaluation Center. It is also the headquarters for operational organizations such as the Air Force Inspection Agency, Air Force Safety Center, and Albuquerque Operations Office of the US Department of Energy (DOE). Kirtland AFB also functions as a training base for the 58th Special Operations Wing of Air Education and Training Command's 19th Air Force; the 150th Fighter Wing of the New Mexico Air National Guard is also stationed at the base.

The US Air Force (USAF) owns most of the land at Kirtland AFB, but several other ownerships and leases apply. The eastern portion of Kirtland AFB is primarily Cibola National Forest land turned over to the USAF by the US Forest Service. These lands have been withdrawn from public use and are known as the withdrawal area (see figure 1-1). The DOE owns certain areas of the base and leases other areas from the USAF (USAF, 1995a).

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTIONS

The 377 ABW at Kirtland AFB proposes to replace the aging septic system in the 600 and 700 area and to renovate the small arms and rifle range on base (figure 1-2). The proposed actions include:



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Locations of Proposed Sewer Line Project and Firing Range on Kirtland Air Force Base

FIGURE 1-2

- Removing or abandoning in place the existing septic system in the 600 and 700 areas, and replacing it with a sanitary sewer main connected to the local sewer intercept, and
- Renovating the small arms and rifle range including associated offices, and classrooms in Bldgs. 707 and 709, including lead-dust decontamination of the indoor range in Bldg. 707, and lead round removal within the berm area. This renovation could involve demolishing the 2 existing buildings and building 1 new facility to replace them.

Septic System, 600 and 700 Area

The proposed action would provide adequate facilities to meet current and future base requirements. The facilities in the 600 and 700 areas are currently on septic systems that are near the end of their design lives. The 600 and 700 numbered facilities are industrial and research facilities where industrial chemicals are used. The aging septic systems present the possibility of these chemicals entering the environment through the septic system leach fields. The proposed sewer system improvements would remove the existing septic systems and connect the 600 and 700 facilities through a sanitary sewer intercept to the main sanitary sewer system on base and to a main sanitary sewer system just south of the base that services the city of Albuquerque. There is a Memorandum of Agreement with the city of Albuquerque to use the sewer line instead of septic systems to prevent risk of contamination from saturation of the septic system leach fields near Tijeras Arroyo. However, it should be noted that the New Mexico Environmental Department, who monitors the septic system under the liquid waste disposal permit under the Liquid Waste Disposal Regulations for New Mexico (20 New Mexico Administrative Code [NMAC] § 7.3, October 1997), does not identify this risk of contamination as a concern.

Small Arms and Rifle Range Facility

The proposed action would provide adequate facilities to meet current and future base and personnel needs, and to comply with building code changes, hazardous waste management and cleanup requirements, other existing regulations and agreements, and mission requirements.

The buildings of concern in the small arms and rifle range facility (Bldgs. 707 and 709) are currently deteriorating due to lack of maintenance. The indoor range (Bldg. 707) is contaminated with lead dust and is currently out of service. There is also a classroom in this facility. The indoor range is classified as a restricted lead-hazard area. The outdoor range is contaminated with lead rounds. The backstop in the outdoor pistol/shotgun range contains so many lead rounds that the range is no longer safe to use and has been closed. The only range currently in use is the rifle/shotgun/pistol outdoor range. This open range has a limited life of only a few years because the overhead and downrange baffles are past their life span and at the end of their usefulness. In addition, the small arms and rifle range is out of compliance with current Air Force regulations for the new ammunition available for use. The proposed project would include removal of the lead dust from the indoor range; removal of lead rounds and renovation of the outdoor ranges; and renovation or demolition and construction of the offices, armory, and classrooms associated with the small arms and rifle range facility. Renovations to the facility would also include improvements to aid in effective stormwater management.

1.3 Decision to Be Made and Decision-Maker

The Air Force must choose the best alternative to support Kirtland AFB and the Air Force, following review of the EA for these proposed actions. The decision to be made is to choose an alternative that best minimizes potential adverse effects while achieving the Air Force objectives of: (a) increasing the efficiency and effectiveness of the sanitary sewer system in the 600 and 700 area on base, (b) bringing facilities up to current code requirements, (c) minimizing hazardous materials exposure to personnel, and (d) maintaining security police and mobility personnel training in the use of firearms.

1.4 Alternative Identification

The CEQ guidelines implementing NEPA, and AFI 32-7061, which implement the USAF NEPA process, require the consideration of reasonable alternatives to a proposed action. Only those alternatives that are determined to be reasonable relative to their ability to fulfill the need for the action warrant a detailed environmental analysis. The identification of such alternatives involves the

definition of a set of criteria that an alternative must meet. Once defined, these criteria must be applied consistently to each of the candidate alternatives.

Two proposed projects are analyzed in this document. The first involves replacement of the aging septic systems in the 600 and 700 area. The criteria for the proposed action and alternatives require the provision of efficient and effective long-term sanitary sewage disposal services to these areas. This narrowed the proposed action and alternatives to installing a new sewer line or replacing the aging septic system with a new one.

An alternative to this proposed action which was considered but not carried forward comprised providing temporary portable toilets. However, since this would not meet the need for long-term facilities, it was eliminated from further consideration.

Criteria for the second proposal require the provision of adequate and safe small arms training to the security and mobility forces on Kirtland AFB. The proposed action and alternatives that met these criteria included: (1) upgrading the existing small arms and rifle range facility, which included decontamination and lead removal activities and installing new baffles to make the facility safe, or (2) using the existing on-base M-60 Range.

Although, the No-Action Alternative does not meet the above criteria, CEQ regulations stipulate that the No-Action Alternative be analyzed to assess any environmental consequences that may occur if the proposed action were not implemented. As a result, the No-Action Alternative is carried forward for analysis in this EA.

1.5 Regulatory Compliance

The following section provides a brief summary of the laws, regulations, Executive Orders (EOs), and other requirements that are routinely considered in an environmental analysis for these types of proposed actions.

1.5.1 Environmental Policy

NEPA (42 United States Code [USC], § 4321, et seq., as amended) requires federal agencies to consider the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The CEQ was established under NEPA to implement and oversee federal policy in this process. In 1979, the CEQ issued the Regulations for Implementing the Procedural Provisions of NEPA. The CEQ regulations encourage federal agencies to develop and implement procedures that address the NEPA process in order to avoid or minimize adverse effects on the environment. DoD Directive 6050.1 establishes DoD policies and procedures to supplement the CEQ regulations promulgated under NEPA.

AFI 32-7061 establishes the EIAP and the specific procedural requirements to implement NEPA on USAF projects. EO 11514, Protection and Enhancement of Environmental Quality, as amended by EO 11991, directs the federal government to provide leadership in protecting and enhancing the quality of the nation's environment.

1.5.2 Air Quality

The Clean Air Act (CAA) (42 USC, § 7401-7671, et seq., as amended) establishes federal policy to protect and enhance the quality of the nation's air resources to protect human health and the environment. The CAA requires that adequate steps be taken to control the release of air pollutants and prevent significant deterioration in air quality. The 1990 amendments to the CAA require federal agencies to determine the conformity of proposed actions with respect to State Implementation Plans (SIPs) for attainment of air quality goals. The US Environmental Protection Agency has set forth regulations in 40 CFR § 51, Subpart W, that require the proponent of an action potentially affecting air quality to perform an analysis to determine if implementation of the action would conform with the SIP.

The CAA developed National Ambient Air Quality Standards for particular pollutants to protect public health with an adequate margin of safety. Carbon

monoxide is one of the six criteria pollutants. Sources that emit hazardous air pollutants (e.g., asbestos) must also conform to the National Emissions Standards for Hazardous Air Pollutants.

1.5.3 Water Quality

The Clean Water Act (CWA) of 1977 and the Water Quality Act of 1987 (33 USC § 1251, et seq., as amended) establish federal policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters and, where attainable, to achieve a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water. It also governs the disposal of wastewater and sets pretreatment standards that apply to the discharge of wastewater through publicly owned treatment works.

1.5.4 Biological Resources

The Endangered Species Act requires federal agencies that fund, authorize, or implement actions to avoid jeopardizing the continued existence of federally listed threatened or endangered species, or avoid destroying or adversely affecting their critical habitat. Federal agencies must evaluate the effects of their actions through a set of defined procedures, which can include preparation of a biological assessment and formal consultation with the US Fish and Wildlife Service.

Section 404 of the CWA regulates development in streams and wetlands and requires a permit from the US Army Corps of Engineers for dredging and filling in wetlands.

EO 11990, Protection of Wetlands, requires that federal agencies provide leadership and take actions to minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

1.5.5 Cultural Resources

AFI 32-7065 implements Air Force Policy Directive 32-70 and DoD Directive 4710.1. It sets guidelines for the protection and management of cultural resources, and requires compliance and coordination with the NEPA, the National Historic Preservation Act (NHPA) of 1966, and related federal standards and authorities. The NHPA establishes policies that support and encourage the preservation of historic and prehistoric resources by directing federal agencies to consider historic properties (i.e., significant cultural resources) in their activities.

The Archaeological and Historic Preservation Act of 1974 directs federal agencies to notify the Secretary of the Interior of historic and archaeological data that may be lost as a result of federal construction or other federally licensed or assisted activities.

The Archaeological Resources Protection Act of 1979 requires a permit for any excavation or removal of archaeological resources from public lands or Indian lands.

1.5.6 Land Use

EO 11988, Floodplain Management, requires each federal agency to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains. Where information is unavailable, agencies are encouraged to delineate the areal extent of floodplains at their site.

1.5.7 Environmental Justice and Safety Risks to Children

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to assess the effects of their actions on minority and low-income populations within the agencies' region of influence. Agencies are encouraged to include demographic

information related to race and income in their analysis of the environmental and economic effects associated with their actions and to identify any potential impacts that may disproportionately affect minority or low-income communities.

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, directs federal agencies to assess the effects of their actions on children within the agencies' region of influence. Therefore, to the extent permitted by law and appropriate, and consistent with the agency's mission, federal agencies shall:

- Make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children; and
- Ensure that its policies, programs, activities, and standards address disproportionate risk to children that result from environmental health or safety risks.

1.5.8 Hazardous Materials/Waste Management

Hazardous waste is regulated by the Resource, Conservation, and Recovery Act (RCRA) of 1976 (including the Hazardous Waste and Solid Waste Amendments of 1984) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. In general, CERCLA primarily regulates inactive hazardous waste sites and RCRA regulates current hazardous waste management practices to avoid a future hazardous waste site. RCRA-regulated hazardous wastes are defined in 40 CFR § 261 and may be designated by virtue of characteristic (e.g., corrosivity) or by specific listing in the regulation. Petroleum, oils, and lubricants are not by definition a hazardous waste and are typically classified as recyclable materials unless the sample is contaminated by a RCRA waste or if it fails one of the characteristic tests (e.g, ignitability).

Numerous regulations govern the handling of hazardous materials and waste. The Lead in Construction Standard (29 CFR § 1926.62) and all other applicable construction safety and health standards found in 29 CFR § 1926 and 1910 would be required for the removal of lead contamination from buildings and equipment. Resulting wastes must be tested and managed in accordance with RCRA.

Kirtland AFB has prepared four plans that implement regulations governing hazardous materials and wastes handling and management. These plans are the Kirtland AFB Asbestos Management Plan (USAF, undated); 377 ABW, Environmental Management Division, Kirtland AFB Lead-based Paint Management Plan (USAF, 1995b); Hazardous Materials Plan 191-96 (USAF, 1997); and Hazardous Waste Management Plan (USAF, 1998c).

For the regulation of the septic system, the Liquid Waste Disposal Regulations for New Mexico (20-NMAC 7.3, October 1997) require the septic systems to be permitted and monitored. The monitoring is done by the state Environmental Department issuing the permit. The closure of the septic system would require the decommissioning of the tanks following a specific set of guidelines set up by the state.

1.5.9 Public Involvement

Section 1.6.8 of EO 12372, Intergovernmental Review of Federal Programs, directs federal agencies to consult with and solicit comments from state and local government officials whose jurisdictions would be affected by federal actions. In addition, NEPA procedures and USAF policy are intended to ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. In order to comply with these requirements, this document will be released for public review prior to completion of the decision-making process.

1.6 Organization of This Document

Section 1 of this EA describes the purpose and need for the proposed actions. Section 2 provides the description of the proposed actions and alternatives. Section 3 describes the affected environment on a resource and factor basis. Section 4, Environmental Consequences, assesses the potential impacts of the proposed actions and alternatives on the resources and factors described in Section 3. Section 5 lists persons and agencies contacted in the preparation of this EA. Section 6 is the list of preparers, and Section 7 contains the references and bibliography.

SECTION 2
DESCRIPTION OF THE PROPOSED ACTIONS AND ALTERNATIVES

Air Force Materiel Command's 377th Air Base Wing (377 ABW) at Kirtland Air Force Base (AFB), New Mexico, is proposing two projects on base: replacement of an aging septic system with a new sanitary sewer system, and a small arms and rifle range rehabilitation and renovation. This section describes the proposed actions and alternatives to these actions.

2.1 DESCRIPTION OF THE PROPOSED ACTIONS

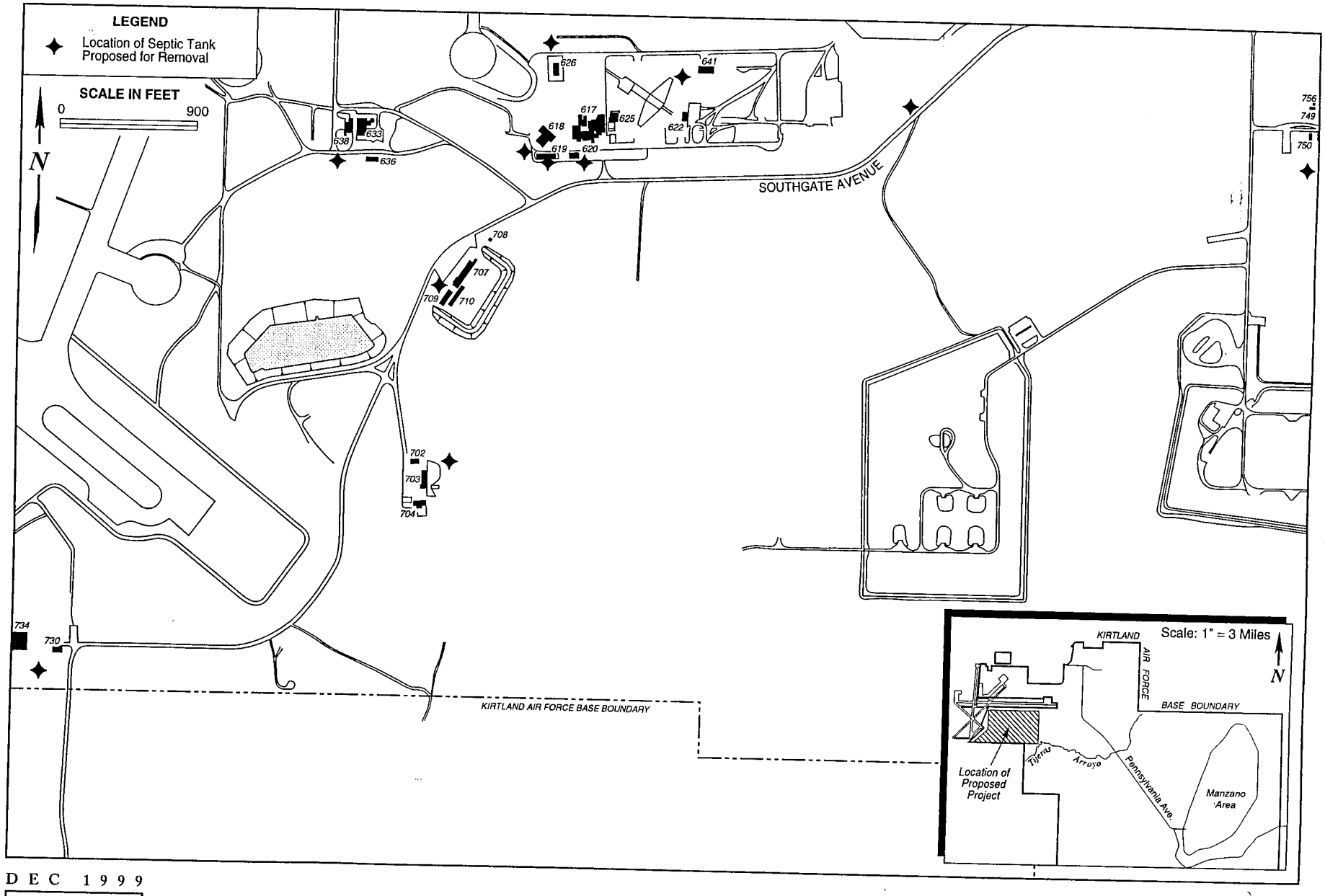
The 377 ABW proposes to construct or renovate the following facilities or structures on Kirtland AFB.

2.1.1 Septic Systems in the 600 and 700 Areas

The proposed action involves replacing eleven existing septic systems in the 600 and 700 areas (figure 2-1) with a sanitary sewer main connected to the city of Albuquerque sanitary sewer system (figure 2-2). This proposal could include the removal of overlying concrete and disposal of the existing septic tanks, and possibly the leach field infrastructure. Alternatively, these tanks may be abandoned in place in accordance with the New Mexico Liquid Waste Disposal Regulations (20 New Mexico Administrative Code [NMAC], § 7.3).

The tanks would be tested for contamination prior to any work being conducted on this system. If hazardous wastes are discovered, they would be handled and disposed of in accordance with the Kirtland AFB Hazardous Waste Management Plan (United States Air Force [USAF], 1998c). If they are not found to contain hazardous waste, the concrete tanks would be pumped clean of solid waste, the input and output ports would be capped off, and the state would inspect the tanks in place. If approved by the state, the tanks could then be removed and disposed of in the Kirtland AFB landfill.

The septic system could also be abandoned in place. There would be 2 inspections. The tanks would be pumped of solid wastes, checked for contaminants, and filled with clean sand up to, but not including, the input and



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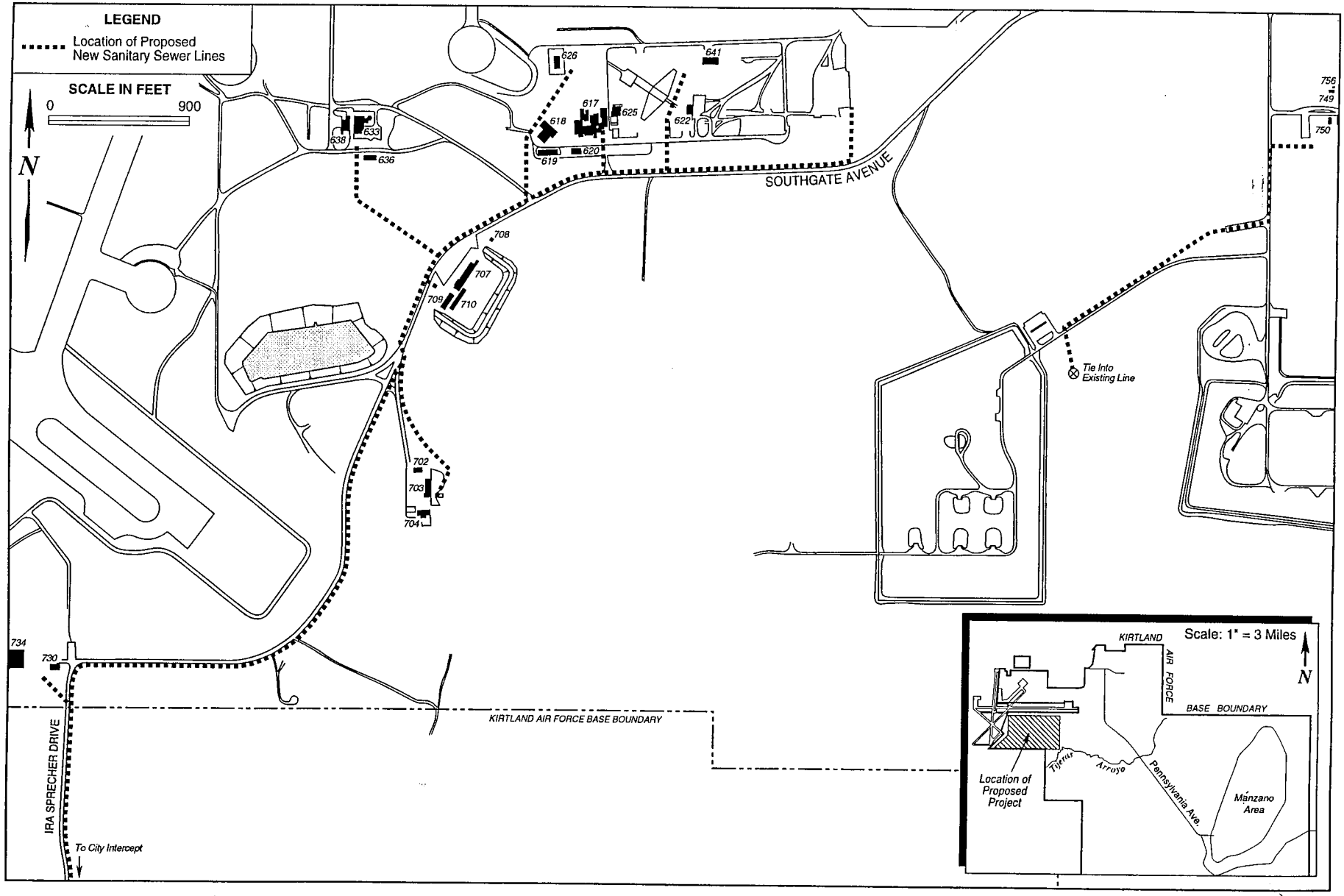
Septic Tanks Proposed for Removal from the 600 and 700 Areas at Kirtland Air Force Base

FIGURE 2-1



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Proposed New Sanitary Sewer Lines in the 600 and 700 Areas at Kirtland Air Force Base

FIGURE 2-2

output lines. The state Environmental Department would come out and inspect the tanks at this stage. Following the inspection, the tanks would be filled to the top with clean sand and a final inspection would occur. The septic tank tracking number would be closed and the tank would be considered an "abandoned sewer" (Flint, 1999).

If the proposed action were implemented, the sewer line would be installed adjacent to roads wherever possible to minimize the environmental impacts of trenching activities. The depth of the pipe installation and the size of the sewer pipe would be determined based on grade and expected volume. The sewer line would be tied into the main sewer line for the city of Albuquerque in two places (see figure 2-2). One would consist of a tie-in to existing on-base sanitary sewer in the 700 area, and one would run off base south of the Ira Sprecher Gate to connect directly to a city of Albuquerque intercept. The estimated liquid waste flow rate for these facilities, without showers, for 112 employees (and 10-20 students for 3 hours per day at the small arms and rifle range) is 3,050 gallons per day (gpd). The maximum flow rate for these facilities if fully utilized would approach 80,000 gpd. The city of Albuquerque could accommodate the higher flow, although the 600 and 700 facilities are never expected to be fully occupied.

Equipment such as bulldozers, backhoes, front-end loaders, dump trucks, associated tractor-trailers, and generators would be required to support septic tank removal. A backhoe with front-end loader, a trencher, and support flatbed truck would be required for sewer line installation. Nonhazardous materials, such as asphalt and concrete, would be transported to the Kirtland AFB landfill for disposal. To meet Department of Air Force waste diversion standards, Kirtland AFB receives monthly reports by item description and weight of any materials removed for recycling or reuse by the contractor. The contractor would remove other nonhazardous municipal solid waste (e.g., plastics, paper, and food waste) from the job site daily. If a dust nuisance or hazard occurs during the activities, water, supplied by Kirtland AFB, would be used for dust control.

Adequate parking would be available for worker vehicles at locations on and adjacent to the project sites. Potable water would be available to the workers in coolers furnished by either the general contractor or individual crews. Restroom

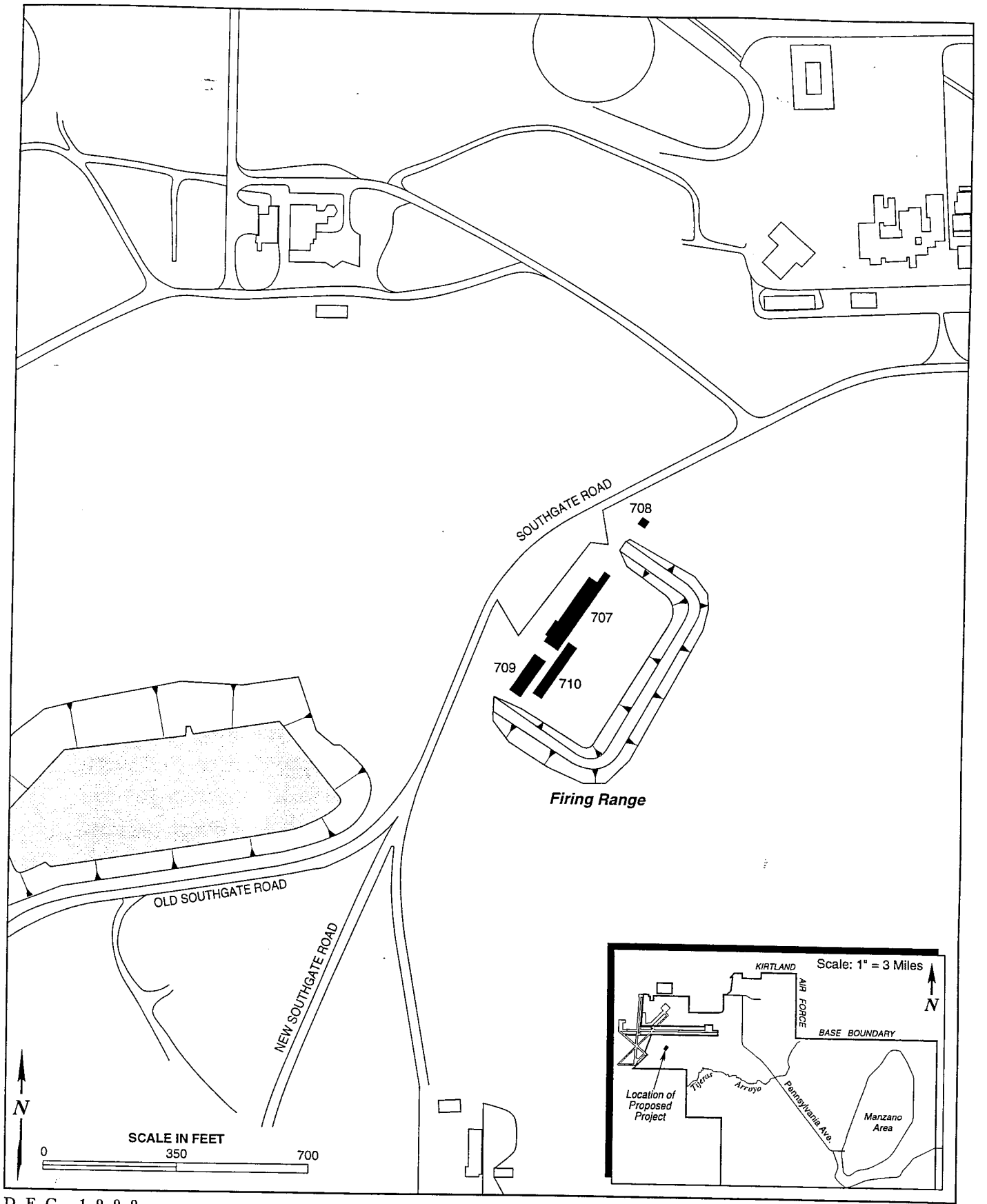
facilities would consist of portable chemical toilets. No additional potable water or disposition of wastewater would be required.

All material needs (e.g., sewer line piping) would be supplied by off-site vendors. No natural gas or steam would be required.

2.1.2 Small Arms and Rifle Range Facility (Bldgs. 707 and 709)

This proposed action is to rehabilitate the small arms and rifle range (figure 2-3), including associated offices, classrooms, and the range itself. There would be major renovations to the buildings, such as replacement of overhead and downrange baffles and exterior renovations to address stormwater drainage. Modifications to the range would include elevation of the embankment and correction of the slope. In addition, lead rounds would be removed from the range and backstop. Lead would be removed from the small arms and rifle range and approximately 4,904 square feet (ft) of drive motors, housings, fan motors, fan ducts, walls, firing stalls, baffles, rafters, rails, and floors in Building 707 would be cleaned of lead dust. The fan motors, drive motors, firing stalls, and baffles would be turned in as government equipment to the proper agency, along with documentation that the property no longer contained lead dust. Asbestos and lead-based paint would also be removed as appropriate. Buildings 707 and 709 could, at this time, be demolished and replaced with a single new facility that would contain the classrooms, offices, and armory in a single facility; or the old facilities could be renovated. Training could continue at the one open outdoor range while the construction or renovation of the rest of the facility is in progress. When the currently closed outdoor range is reopened, training could switch to that range while the other outdoor range is rehabilitated, although all downrange renovation activities would have to occur while the ranges are not in use.

Equipment such as bulldozers, backhoes, front-end loaders, dump trucks, associated tractor-trailers, and generators could be required to support the small arms and rifle range renovation. Except as noted for lead or other hazardous materials in the following paragraphs, renovation activities would generally include the removal of nonhazardous materials such as wood, plasterboard, and metals. Nonhazardous renovation debris would be transported to the Kirtland



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Firing Range Site (Buildings 707, 708, 709, and 710)
Kirtland Air Force Base

FIGURE 2-3

AFB landfill for disposal. An on-site dumpster would be provided by the contractor for other nonhazardous municipal solid waste (e.g., plastics, paper, and food waste) that could be generated by worker activity at the project sites. When the dumpster is full, the debris would be transported to a permitted Subtitle D landfill. Any cardboard generated would be separated and delivered to the base landfill or the Sandia National Laboratories Solid Waste Transfer Station where a roll-off unit is available for cardboard recycling. In accordance with Department of Defense Instruction 4715.4, paragraph F.2.c.(3)(f), salvageable metal debris resulting from the renovation activities would be removed and transported to the Defense Reutilization and Marketing Office (DRMO) located at Kirtland AFB for recycling, or to any certified recycling facility. If a dust nuisance or hazard occurs during the activities, water supplied by Kirtland AFB would be used for dust control.

Prior to renovating or demolishing Building 707, lead dust and equipment (fans, motors, baffles, etc.) would be removed from the building. The contractor must comply with the Lead in Construction Standard (29 Code of Federal Regulation [CFR] § 1926.62) and all other applicable construction safety and health standards found in 29 CFR § 1926 and 1910. Resulting wastes must be tested and managed in accordance with the Resource Conservation and Recovery Act (RCRA) because the current lead content renders them a suspected hazardous waste. DRMO and the Environmental Management Division would require swipe testing or other documentation of lead decontamination before acceptance of any property removed from the facility. Similar documentation would also be required for building debris prior to acceptance in the solid waste (nonhazardous) landfill (Kitt, 1999).

The lead rounds and surrounding soils removed from the small arms and rifle range may also be a RCRA hazardous waste, depending on the size of the fragments and if the materials fail the toxicity characteristic leachate procedure. However, lead rounds may be RCRA-exempt if sent to a qualified recycler.

Existing information would be reviewed or new surveys for hazardous materials (e.g., asbestos, lead-based paint) would take place prior to any renovation or demolition of Buildings 707 and 709. Should any of these materials be identified, they would be handled and disposed of in accordance with the

Kirtland AFB Asbestos Management Plan (USAF, undated); the 377 ABW, Environmental Management Division, Kirtland AFB Lead-based Paint Management Plan (USAF, 1995b); Hazardous Materials Plan 191-96 (USAF, 1997); and Hazardous Waste Management Plan (USAF, 1998c).

Worker vehicles would be parked at the small arms and rifle range parking lot. Potable water would be available to the workers in coolers furnished by the general contractor or individual crews, or from the range facility. Restroom facilities would be provided within the facility or as portable toilets.

All material needs (e.g., steel, wood, and plasterboard) would be supplied by off-site vendors. The small arms and rifle range project would require small amounts of electricity for the construction or renovation activities. No natural gas or steam would be required.

2.1.3 Permitting, Licensing, and Consultation

Cumulatively, the proposed projects could potentially disturb five acres: approximately 1.5 acres for the sewer line installation (15,000 linear ft by a 4 ft-wide path of disturbance), and approximately 3.5 acres are within the small arms and rifle range berms that could potentially be disturbed. However, since the proposed actions are not contiguous, they are not subject to National Pollutant Discharge Elimination System (NPDES) stormwater pollution prevention planning requirements. Currently, Kirtland AFB maintains a NPDES General Stormwater Permit for industrial activities.

The state of New Mexico requires that septic systems are permitted under the Liquid Waste Disposal Regulations for New Mexico (20 NMAC § 7.3). These permits require periodic inspections and specific steps that must be followed when the status of any of these tanks is altered (i.e., closed and removed, closed and abandoned, new ones installed, or downgraded to holding tanks [as described in section 2.2.1.2, No-Action Alternative]). Under this same regulation, the Wastewater Utilities Division in the city of Albuquerque would require notification of the additional estimated effluent that would be delivered to the publicly owned treatment works by the new sewer in order to modify the existing wastewater permit for Kirtland AFB.

A 1541 National Emission Standards For Hazardous Air Pollutants permit and a Notice of Asbestos Demolition/Renovation (40 CFR § 61, subpart M) permit would be required for renovation of those facilities containing asbestos. In addition, the construction contractor would be required to obtain a Soils Disturbance (Dust) Permit from the city of Albuquerque for both projects since they would each disturb in excess of 0.75 acres.

Air Force Instruction 32-7060 requires the USAF to coordinate and consult with local, state, and federal agencies having jurisdiction over lands or resources potentially affected by a proposed action, in accordance with Executive Order 12372. This coordination and consultation serves two purposes: (1) to seek and receive from these agencies data that are pertinent to the existing environment of the affected area, and (2) to derive from the agencies information on potential issues associated with lands or resources within their purview. In addition, there are laws and regulations governing specific resources, such as protected biological and cultural resources, which require consultation efforts with agencies having specific purview over those resources.

2.2 ALTERNATIVES TO THE PROPOSED ACTIONS

2.2.1 Septic System in the 600 and 700 Areas

2.2.1.1 Septic System Replacement

The alternative to the proposed action involves replacing the septic system in the 600 and 700 areas with new septic tanks, thus reducing the risk of the leach fields becoming saturated and ineffective (see figure 2-1). The new sewer line would not be installed as described under the proposed action. This action would entail testing the tanks for hazardous materials. Tanks not containing hazardous materials could be pulled and taken to the base landfill for disposal, or abandoned in place as described for the proposed action. Tanks containing hazardous materials would be handled and disposed of in accordance with the Kirtland AFB Hazardous Waste Management Plan (USAF, 1998c).

A new septic system would be installed after the old system is removed or abandoned in place as described in Section 2.1.1. The new tanks would be either

installed to replace removed tanks or sited in the vicinity of abandoned tanks. Each septic tank site would be evaluated to determine what would be required, including whether a new leach field would be necessary. If new sites are required, they would be selected at that time and site-specific biological and cultural surveys would be required. Prior to installing a new tank, a licensed plumber must submit a permit to the state Environmental Department and the state must inspect each tank prior to installation (Flint, 1999).

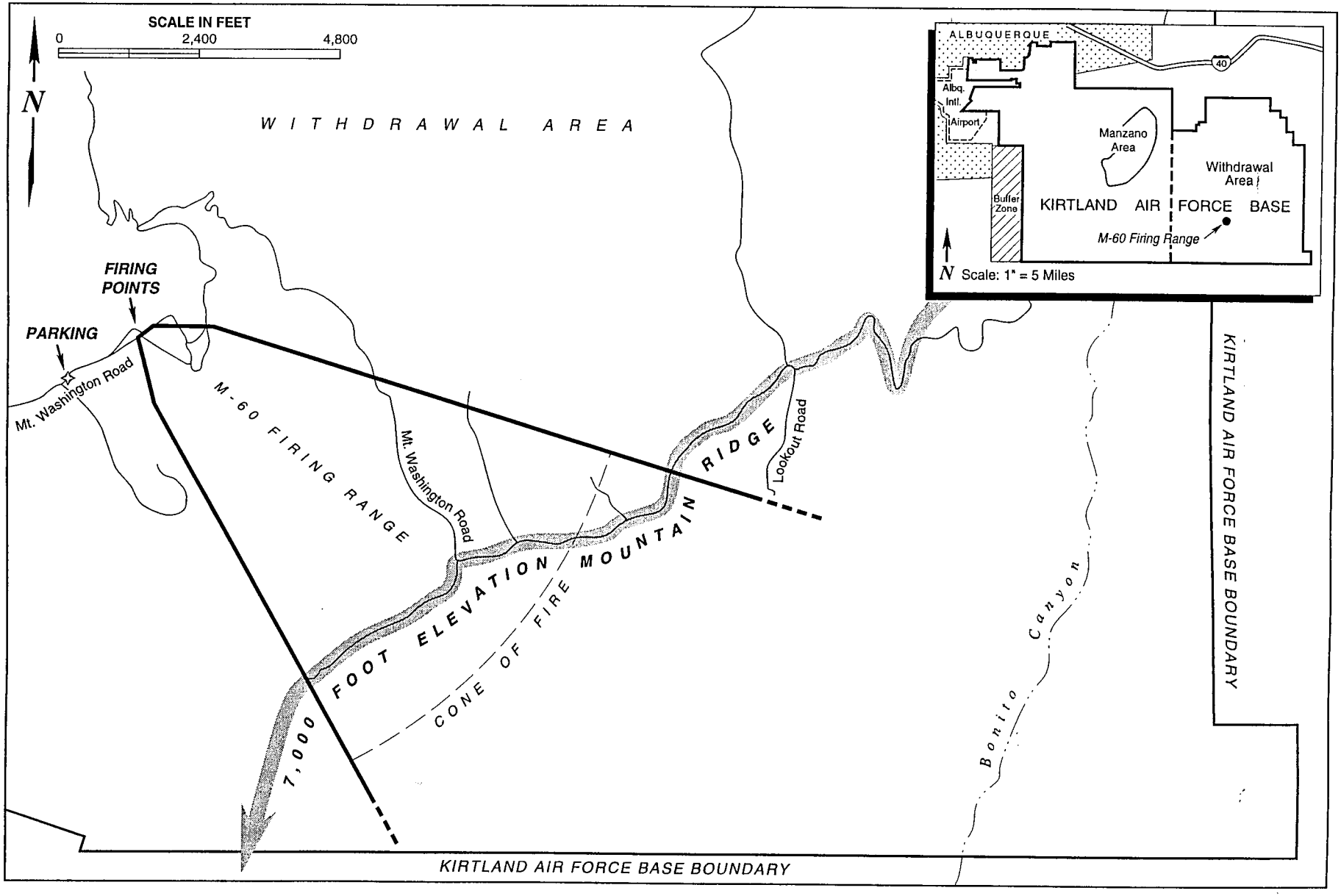
2.2.1.2 No-Action Alternative

Under this alternative, Kirtland AFB would leave the existing septic systems in place and allow existing conditions to prevail. These systems are reaching the end of their life span and could saturate associated leach fields, rendering them ineffective. If the leach fields become plugged, the system can be put under high pressure to try to open the drainage holes in the leach-field pipes. If this does not work, the septic tank must be officially registered as a holding tank which is regularly checked by the state and pumped on a regular schedule as designated by the liquid waste disposal regulations for New Mexico. A log must be kept reflecting the pumping schedule. As the leach fields fail, the septic systems could be replaced on a case by case basis as part of normal maintenance of the system. Since these tanks are concrete, there is not a concern of the tanks corroding in place. The tanks are currently pumped on a conservative schedule of 1 to 4 times per year, just to help extend the life of the system, and to regularly clean and check the tanks for contaminants (Flint, 1999).

2.2.2 Small Arms and Rifle Range Facility

2.2.2.1 Use of the M-60 Machine Gun Range On Base

The alternative to the proposed action involves training security and mobility personnel at the M-60 machine gun Range that is located approximately 10 miles southeast of the small arms and rifle range in the withdrawn area of the base (figure 2-4). The M-60 Range can handle the expected training volume, although additional coordination would be required among other groups using that area including: the 58th Special Operations Wing, the Marines, the National Guard, Army Reserve Engineering Detachment, the Department of Energy Sandia



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Alternative Firing Range (M-60) Location

FIGURE 2-4

Laboratories, and the horse stables (Allen, 1999). A new impact cone has been developed for the M-60 Range (figure 2-4). The shooting direction is to the southeast down Frustration Canyon, the range has been sited to use a 7,000-foot mountain as a backstop.

If this alternative were selected, the renovation of the existing small arms and rifle range facility would not occur and the range would cease to be usable in about three years. Facility 707 would remain closed due to lead contamination. At the end of its usable life, the entire facility would be closed and a project to remove the lead and restore the site would be initiated. Personnel would be transported 21.5 miles round trip to the M-60 Range for small arms training (Dixon, 1999). A central meeting point would be established probably at the small arms and rifle range by the 707 facility. Bussing would be necessary, due to the M-60 Range's remote location, limited access to the area, the rough dirt road leading to the range, and the lack of parking facilities at the site. For purposes of analysis, it was assumed that 250 of these trips would be made per year.

2.2.2.2 No-Action Alternative

Under this alternative, Kirtland AFB would not renovate the firing range, thus allowing it to continue to deteriorate and reduce its beneficial use. The 707 facility would not be decontaminated and would remain closed. The service life of the range facility is anticipated to be only another three years (Dixon, 1999). At some point in time, the lead in the facility would have to be removed as the building continues to deteriorate. This would not support the goal of maintaining the small arms training and qualification of the security and mobility personnel.

2.3 OTHER FUTURE ACTIONS ON THE BASE

Reasonably foreseeable actions identified on base that may contribute to potential cumulative impacts for the action being assessed in this document include the construction of the new Nuclear Weapons Integration Division Facility, the relocation of Gibson Gate, the Prairie Dog Relocation project, and the Fire Training Facility construction and operation.

2.4 SUMMARY OF IMPACTS

Table 2-1 (Septic System Project) and table 2-2 (Firing Range Facility Project) presents a summary of the impacts associated with the proposed action and alternatives. The tables compare the potential impacts of each proposed action and alternative. For more detailed information, see the resource discussions in Chapter 4.

Table 2-1. Comparison of Septic System for the 600 and 700 Areas Project Alternatives by Resource and Potential Impact

Project Elements	Proposed Action – Sewer Line	Alternative 1 – Septic System Replacement	No-Action Alternative	Irreversible and Irretrievable Commitment of Resources
Human Heath and Safety	Although the sewer line traverses an RPZ and an explosive safety zone, it will be underground and complies with the construction restrictions of those areas. A beneficial impact would occur from improving and extending the life of the wastewater disposal system.	One septic tank is present in an explosive safety zone, but its replacement would not violate the restrictions of this zone. A beneficial impact would occur from improving and extending the life of the wastewater disposal system.	The systems would be maintained as required by permit.	None.
Air Quality	Minor increases in CO, NOx, and dust emissions from construction activities.	Minor increases in CO, NOx, and dust emissions from construction activities.	No impact.	None.
Noise	Minor increases in noise during construction activities.	Minor increases in noise during construction activities.	No impact.	None.
Land Use	No change in land use would occur since the sewer line is compatible with the road shoulder use.	No change.	No change.	None.
Geological Resources	Would require a soils disturbance permit to install the sewer line. Minor soil erosion could occur during construction activities.	Minor soil erosion could occur during construction activities.	No impact.	None.

Table 2-1. Comparison of Septic System for the 600 and 700 Areas Project Alternatives by Resource and Potential Impact (continued)

Project Elements	Proposed Action – Sewer Line	Alternative 1 – Septic System Replacement	No-Action Alternative	Irreversible and Irretrievable Commitment of Resources
Water Resources	A small portion of the off-base sewer line lies in a floodplain. However, the sewer line would be underground, and therefore, compatible with this feature.	No impact.	No impact.	None.
Biological Resources	Minor impacts to vegetation and wildlife from construction activities.	Minor impacts to vegetation and wildlife from construction activities.	No change.	None.
Transportation and Circulation	Minor, temporary increase in traffic resulting from construction-related trips.	Minor, temporary increase in traffic resulting from construction-related trips.	Negligible increase in traffic due to the need for a monthly pumper truck.	None.
Visual Resources	No change.	No change.	No change.	None.
Cultural Resources	A potential for finding unknown buried cultural resources during trenching activities.	None expected.	No impact.	None.
Socioeconomics	Temporary, minor, beneficial impact on the local economy from construction contracts and need for materials.	Temporary, minor, beneficial impact on the local economy from construction contracts and need for materials.	No change.	Use of manpower and resources for this project.
Environmental Management	Permits and guidelines would be followed for handling and disposing of any hazardous substance encountered during septic tank removal or equipment maintenance. Albuquerque's public treatment works can handle the quantity of wastewater that could be generated by these facilities.	Permits and guidelines would be followed for handling and disposing any hazardous substance encountered during septic tank removal or equipment maintenance.	Permits and guidelines would be followed for the septic systems possible conversion to holding tanks.	None.

Table 2-2. Comparison of Firing Range Facility Project Alternatives by Resource and Potential Impact

Project Elements	Proposed Action – Range Renovation	Alternative 1 – Use of the M-60 Range	No-Action Alternative	Irreversible and Irretrievable Commitment of Resources
Human Heath and Safety	Beneficial impacts from the improvements of facilities, baffles, embankment, and removal of lead contamination.	No change.	Accumulated lead rounds in the baffles and backstop reduce their effectiveness in stopping new rounds and could result in a decreased safety environment by allowing the rounds to ricochet.	None.
Air Quality	Minor increases in CO, NOx, and dust emissions from renovation activities.	No impact.	No impact.	None.
Noise	Minor increases in noise during renovation activities.	Minor increases in noise during because of increased use of the range.	No impact.	None.
Land use	No change.	No change in land use, however, the increase in use of the M-60 range would have to be coordinated with other users.	No change, although the firing range would be closed within approximately three years.	None.
Geological Resources	Minor soil erosion could occur during renovation activities.	No change.	No impact.	None.
Water Resources	No impact.	No impact.	No impact.	None.
Biological Resources	Minor impacts to vegetation and wildlife from renovation activities.	Negligible impacts to wildlife from increased use of the M-60 Range.	No impact.	None.
Transportation and Circulation	Minor, temporary increase in traffic resulting from renovation-related trips.	Negligible increase in traffic resulting from bussing students to the M-60 Range.	No change.	None.
Visual Resources	No change.	No change.	No change.	None.
Cultural Resources	No impact.	No impact.	No impact.	None.

Table 2-2. Comparison of Firing Range Facility Project Alternatives by Resource and Potential Impact (continued)

Project Elements	Proposed Action – Range Renovation	Alternative 1 – Use of the M-60 Range	No-Action Alternative	Irreversible and Irretrievable Commitment of Resources
Socioeconomics	Temporary, minor, beneficial impact on the local economy from renovation contracts and need for materials.	No impact.	No impact.	Use of manpower and resources for this project.
Environmental Management	Permits and guidelines would be followed for handling and disposing any hazardous substance encountered during renovation or equipment maintenance.	Range cleanup of lead rounds would need to occur more frequently with the increased use of the range.	Within three years, the small arms range would be closed and a project would be initiated to clean up the lead contamination and to restore the site.	None.

SECTION 3
AFFECTED ENVIRONMENT

This section describes relevant existing environmental conditions for resources potentially affected by the proposed actions and alternatives. In compliance with guidelines contained in the National Environmental Policy Act, Council on Environmental Quality regulations, and Air Force Instruction 32-7061, the description of the affected environment focuses on only those resources potentially subject to impacts.

Resource descriptions and other factors analyzed focus on the following areas: human health and safety including protection of children, air quality, noise, land use, geological resources, water resources, biological resources, transportation and circulation, visual, cultural resources, socioeconomics including environmental justice, and environmental management including hazardous waste and materials use.

3.1 HUMAN HEALTH AND SAFETY

3.1.1 Definition of Resource

Health and safety issues are defined as those directly affecting the continued ability to protect and preserve life and property at the proposed project sites. Health and safety pertains to hazards arising from physical conditions in the workplace and the actions of people working. The field of safety is focused on prevention of accidents and mitigation of damages resulting from accidents. An accident is an undesirable, unplanned event resulting in physical harm to a person, damage to property, or interruption of business. An accident may be the result of an unsafe act or condition. Each worker must try to work safely, despite adverse conditions of the work environment. A high degree of safety awareness must be maintained so that safety factors involved in a task become an integral part of that task.

Safety issues typically associated with and specific to military airfields include the potential for mid-air aircraft mishaps, aircraft collisions with objects on the ground (e.g., towers, buildings, or mountains), weather-related accidents, and

bird-aircraft collisions. The proposed actions analyzed in this Environmental Assessment (EA) do not affect the type or frequency of aircraft operations conducted at Kirtland Air Force Base (AFB) or Albuquerque International Sunport, therefore, this safety analysis focuses only on ground-based safety issues. Nevertheless, the distribution and significance of runway protection zones (RPZs) at the end of the runways are discussed.

Siting requirements for munitions and ammunition storage and handling facilities are based on safety and security criteria. Air Force Manual 91-201 requires that defined distances be maintained between munitions storage areas and other types of facilities. These distances, called quantity-distance (QD) arcs, are determined by the type and quantity of explosive material to be stored. Each explosive material storage or handling facility has QD arcs extending outward from its sides and corners for a prescribed distance. QD arcs define explosive safety zones. Within these explosive safety zones, development is either restricted or prohibited to ensure safety of personnel and minimize potential for damage to other facilities in the event of an accident. In addition, explosive material storage and handling facilities must be located where security of the munitions can be maintained at all times.

Because children may suffer disproportionately from environmental health and safety risks, Executive Order (EO) 13045, Protection of Children from Environmental Health and Safety Risks, was introduced in 1997. EO 13045 prioritize the identification and assessment of environmental health and safety risks that may affect children and ensures that federal agencies' policies, programs, activities, and standards address risks to children. This section identifies the distribution of children and locations where numbers of children may be proportionately high (e.g., schools) in areas potentially affected by implementation of proposed actions.

3.1.2 Existing Conditions

3.1.2.1 Safety Preparedness

Kirtland AFB has a general safety policy relating to the performance of all activities on the base. Personnel are expected to give full support to safety

efforts. Safety awareness and strict compliance with established safety standards are expected. In the event of a mishap, incidents are investigated, lessons learned are documented, and corrective action is taken. Safety is an integral part of mission performance at Kirtland AFB, and supervisors and managers are strongly encouraged to prevent mishaps. In addition, the Kirtland AFB Disaster Preparedness Operation Plan (Kirtland AFB, 1993) establishes procedures to respond to and recover from disasters or accidents, created or natural, affecting assigned and tenant organizations at Kirtland AFB, as well as the surrounding area. This plan includes procedures for responding to hazardous material spills and severe weather.

3.1.2.2 Human Health

Contractor personnel for the proposed actions at Kirtland AFB would be responsible for ensuring ground safety and compliance with all applicable occupational health and safety regulations, and worker compensation programs. Contractors would also be required to conduct construction activities in a manner that would not pose risks to personnel currently occupying any existing facilities.

3.1.2.3 Industrial Hygiene

Exposure to hazardous materials, use of personal protective equipment, and availability of Material Safety Data Sheets are managed under industrial hygiene programs. Industrial hygiene is the joint responsibility of bioenvironmental engineering and contractor safety departments, as applicable. These responsibilities include: reviewing all potentially hazardous workplace operations; monitoring exposure to workplace chemical (e.g., asbestos, lead, and hazardous materials), physical (e.g., noise and radiation), and biological agents (e.g., infectious waste); recommending and evaluating controls to ensure personnel are properly protected (e.g., ventilation and respirators); and ensuring a medical surveillance program is in place to perform occupational health physicals for those workers subject to exposure to workplace hazards.

3.1.2.4 Runway Protection Zones

At Department of Defense (DoD) owned airfields, land use compatibility and RPZs are addressed under the Air Installation Compatible Use Zone program (United States Air Force [USAF], 1994). The USAF further divides RPZs into clear zones and accident potential zones. For joint use airfields, such as Albuquerque International Sunport, RPZs are established in accordance with Federal Aviation Administration (FAA) regulations. RPZs are trapezoidal zones that extend outward from the ends of active runways at commercial airports. They delineate areas recognized as having the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. Development restrictions within RPZs are intended to preclude incompatible land use activities from being established in these areas subject to increased accident potential.

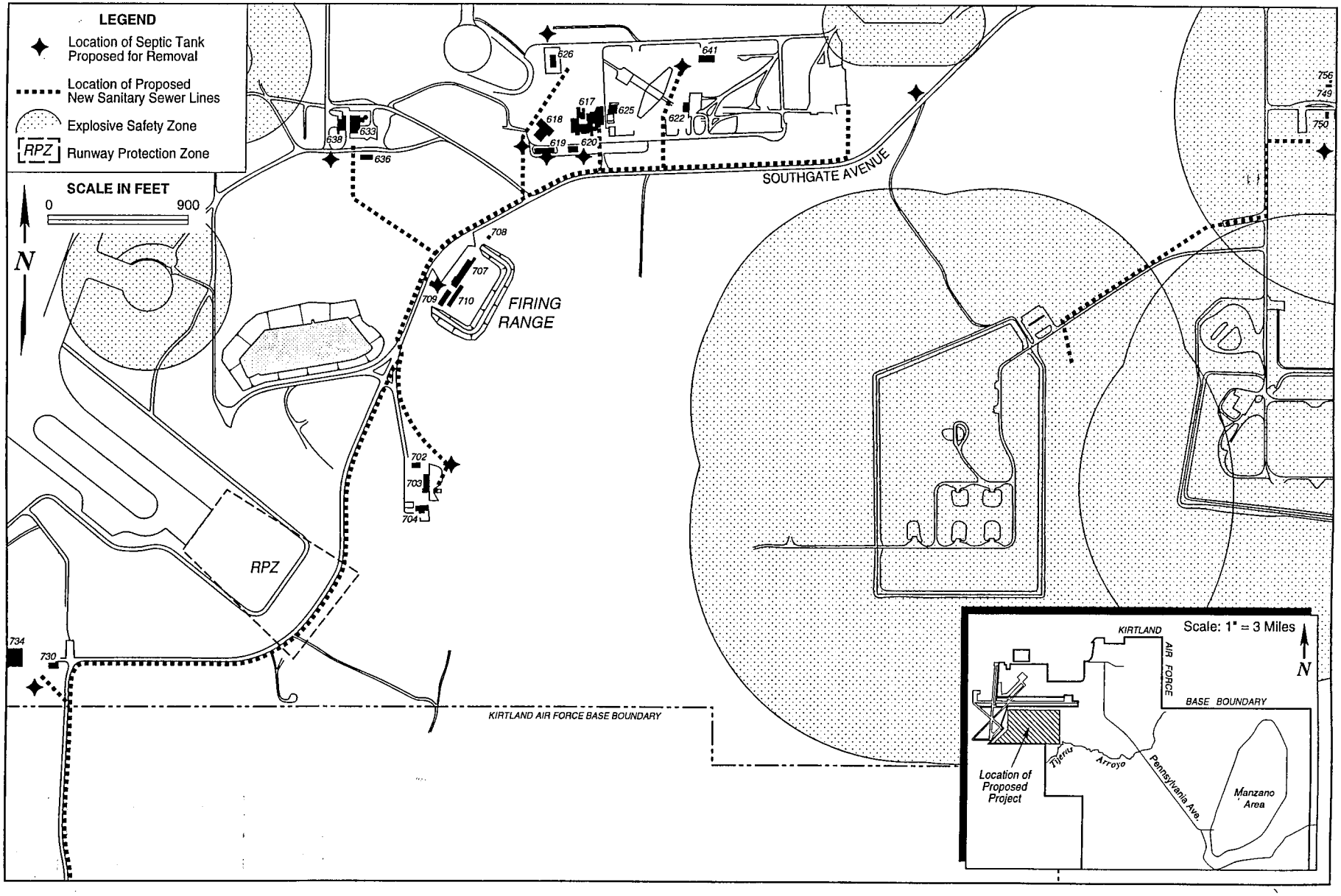
The following land uses are generally restricted or prohibited in RPZs:

- Uses that release substances into the air that would impair visibility or otherwise interfere with aircraft operation,
- Uses that emit light or reflections that would interfere with pilot vision,
- Uses that produce electrical emissions that would interfere with aircraft communication or navigation systems,
- Uses that attract birds or waterfowl,
- Uses that provide for structures within 10 feet (ft) of aircraft approach, departure, or transitional surfaces, and
- High-density functions such as multi-story buildings, places of assembly (e.g., churches, restaurants, schools, theaters), and high-density office uses.

Presently, no incompatible land use is occurring in RPZs associated with the airport and current zoning designations would prohibit such development in the future (figure 3-1). The proposed sewer line would cross an RPZ near the southern boundary of the base. The small arms and rifle range is not in an RPZ.

3.1.2.5 Airfield Clearance Requirements

Airport obstruction-free areas and "imaginary surfaces" relative to runways and taxiways, defined by Federal Aviation Regulation Part 77.28, impose constraints



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Explosive Safety and Runway Protection Zones in the Vicinity of the Proposed Projects

FIGURE 3-1

on facilities adjacent to the runways. Aeronautical charts indicate the locations of most transmission lines and obstructions 200 ft above ground level or higher. Further, potentially hazardous obstructions are listed in the special operating procedures of the DoD Flight Information Publication AP-1B used by aviators and navigators. However, the proposed projects are not adjacent to the runways nor would they create tall new utilities or structures.

3.1.2.6 Explosive Safety Zones

The installation requires explosive safety zones around facilities containing potentially explosive materials. Within these safety zones, other structures or activities are restricted. Only one septic tank and new sewer line system are located within explosive safety zones (figure 3-1). The septic tank near building #750 is within the explosive safety zone from building #751, and the proposed sewer line that connects building #750 and the 740 complex crosses through that same zone and enters the explosive safety zones from all 8 buildings in the 740 complex. There are no safety zone concerns for the small arms and rifle range (figure 3-1). No other hazardous condition is known at these locations.

3.1.2.7 Distribution of Children

Children are not allowed in the laboratories of the 600 or 700 areas or at the small arms and rifle range. Children are expected to be present at areas located well away from the proposed project sites such as the housing areas and associated facilities (e.g. parks and soccer fields), and at the 3 elementary schools located at the base.

3.2 AIR QUALITY

3.2.1 Definition of Resource

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the US Environmental Protection Agency (EPA) for criteria pollutants, including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10

microns in diameter (PM_{10}), and lead (Pb). The Clean Air Act (CAA) requires all states comply with the NAAQS, as demonstrated by the comparison of measured pollutant concentrations and the NAAQS.

NAAQS represent the maximum levels of background pollution considered acceptable, with an adequate margin of safety to protect public health and welfare. These pollutants are typically quantified in units of parts per million (ppm), milligrams per cubic meter, or micrograms per cubic meter ($\mu g/m^3$). The state of New Mexico has adopted additional standards for air quality, the New Mexico Ambient Air Quality Standards (NMAAQS), which apply a more stringent standard for CO, SO_2, and the 24-hour standard for NO_2. Both the NAAQS and NMAAQS are shown in table 3-1.

An area where air quality is better than the NAAQS for a particular pollutant is referred to as an "attainment" area for that pollutant. An area where ambient air quality is characterized by repeated exceedances of the NAAQS is referred to as a "nonattainment" area for that pollutant. An area can be considered an attainment area for certain pollutants and nonattainment for others. Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant(s) is referred to as "unclassifiable." The state of New Mexico uses the NAAQS for attainment determinations; the NMAAQS are used for permitting purposes only.

Air quality at a given location is a function of several factors, including the quantity and dispersion rates of pollutants in the region, temperature, presence or absence of inversions, and topographic and geographic features of the region. For the purposes of this EA, Bernalillo County forms the region of concern for air quality.

Table 3-1. National and New Mexico Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[a] (Primary)[b]	NMAAQS[c]
O_3	1-hour	0.12 ppm (235 µg/m^3)	0.12 ppm (235 µg/m^3)
CO	8-hour	9 ppm (10,000 µg/m^3)	8.7 ppm (9,900 µg/m^3)
	1-hour	35 ppm (40,000 µg/m^3)	13.1 ppm (14,900 µg/m^3)
NO_2	Annual	100 µg/m^3	100 µg/m^3
	24-hour	None	0.10 ppm (200 µg/m^3)
SO_2	Annual	80 µg/m^3 (0.03 ppm)	0.02 ppm (52 µg/m^3)
	24-hour	365 µg/m^3 (0.14 ppm)	0.10 ppm (260 µg/m^3)
PM_{10}[d]	Annual	50 µg/m^3	50 µg/m^3
	24-hour	150 µg/m^3	150 µg/m^3
Pb	Quarter	1.5 µg/m^3	1.5 µg/m^3

Source: Title 40, Part 50 of the Code of Federal Regulations (CFR).

Notes: [a] National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

[b] National Primary Standards express the level of air quality necessary to protect the public from any known or anticipated adverse effects of a pollutant, allowing for a margin of safety to protect sensitive members of the population.

[c] Standards are presented for pollutant data reported in the State of New Mexico Air Quality Bureau annual report summaries.

[d] Particulate matter less than 10 microns in diameter.

3.2.2 Existing Conditions

3.2.2.1 Climate and Regional Air Quality

In the vicinity of the proposed action, high temperatures average 90 degrees Fahrenheit (°F) and low temperatures average 58°F during the summer months. Winters are substantially cooler, with an average daily high temperature of 58°F and an average daily low temperature of 27°F (October to April). Annual average precipitation in Bernalillo County ranges from 8 inches in the county's arid valley and mesa areas to 30 inches in the mountains east of Kirtland AFB. Precipitation increases with increasing elevation and occurs primarily during the

summer months (US Department of Agriculture [USDA], 1977). Half the average annual precipitation falls from July to October, with an average of 44 heavy thunderstorms occurring each year, mostly during this period. Average annual snowfall ranges from approximately 10 inches in the valley to 3 ft in the foothills and up to 10 ft in the higher mountains. The snow season in the valley extends from November to early April, but snow seldom stays on the ground for more than one day.

Prevailing winds in the area are from the north during the winter, and from the south along the river valley in the summer. The average annual wind speed is 9 miles per hour, with the windy season occurring during the spring months. Gusts up to 50 miles per hour can occur in Tijeras Canyon from the release of heavy cold air held back by the Sandia and Manzanita Mountains.

The Albuquerque metropolitan area and Kirtland AFB are within New Mexico's Air Quality Control Region No. 2, which is 1 of 8 regions in the state. Region No. 2 includes all of northwestern New Mexico. For Bernalillo County, the air quality control is managed by the Albuquerque-Bernalillo County Air Quality Control Board, although air quality management functions are performed by the Albuquerque Department of Environmental Health, Air Pollution Control Division.

In the past, NAAQS and NMAAQS violations have occurred at major intersections and in uptown Albuquerque due to high volumes of automobile emissions. The city of Albuquerque has been designated as being in maintenance status for an attainment area for CO as of 15 June 1996 and is currently in attainment for all other federally regulated pollutants (Peyton, 1996).

Currently, the city of Albuquerque controls CO emissions through automotive inspection and maintenance programs, oxygenated fuel requirements, and transportation control measures. The Albuquerque Environmental Health Department, Air Pollution Control Division, also implements a program during the winter months restricting the use of wood-burning fireplaces and stoves during inversion conditions.

Fugitive dust is also a contributor to air pollution within the region due to New Mexico's dry climate. Under dry conditions, windblown dust from local fields, streets, roads, and construction zones increases. Table 3-2 displays 1993 and 1995 emissions data for Bernalillo County.

Table 3-2. Air Emissions Inventory of Bernalillo County

Source Category	Emissions (tons/year)				
	HC[a]	CO[b]	NO_x[a]	SO_x[a]	TSP[a]
Transportation	19,258	100,414	12,860	245	2,564
Residential	1,151	10,112	747	20	1,120
Public roadway (dust)	NA	0	NA	NA	38,315
Industrial	1,640	125	2,007	10	1,475
Commercial	NA	80	327	2	16
Agricultural	NA	0	NA	NA	13
Construction/development	NA	0	NA	NA	17,281
Solid waste disposal	6	156	7	NA	<1
Miscellaneous	99	220	19	3	63
Total	22,154	111,107	15,967	280	60,847

Source: Albuquerque Environmental Health Department, 1995a and 1995b

Notes: a = 1993 data
b = 1995 data
NO_x = Nitrogen oxides
TSP = Total Suspended Particulates
HC = Hydrocarbons
CO = Carbon monoxide
SO_x = Sulfur oxides
NA = No data available

3.2.2.2 Air Quality in the Project Area

Air quality in and around Kirtland AFB is a function of normal climatic conditions in the region, combined with the concentrations of airborne pollutants from a variety of sources. A study was completed at Kirtland AFB in which a list of facilities with air emissions (of both attainment criteria pollutants and toxic pollutants) was developed. From this list, all of the pollutants were then quantified. Some facilities located on the installation generate periodic emissions. The study calculated the total potential air emissions using the quantities of hazardous and toxic pollutants maintained at each facility. Based upon the results of the emissions study, Kirtland AFB is subject to Title V permitting requirements. A Title V permit application was submitted in

December 1995 to the Albuquerque-Bernalillo County Air Pollution Control District and deemed complete in June 1996. Table 3-3 summarizes the air emissions inventory for Kirtland AFB.

Estimated air quality measurements that apply to the air quality in the vicinity of Kirtland AFB are taken from air monitoring stations located near the installation. The closest of these stations, located about 4,000 ft north of the base, monitors CO and PM_{10}.

The major source of air pollutants at Kirtland AFB is privately owned vehicles. Kirtland AFB, through its transportation management program, is engaged in a phased program to convert government-owned gasoline-powered vehicles to natural gas. Other primary emission sources on the installation include aircraft operations and fire fighting training. Major hydrocarbon emission sources include fuel evaporative losses from jet and diesel fuel storage, transfer, and use.

3.2.2.3 State Implementation Plan

The CAA Amendments of 1990 place most of the responsibility on the states to achieve compliance with the NAAQS. The primary vehicle for implementation is known as the State Implementation Plan (SIP), which the EPA requires each state to prepare. A SIP is a compilation of goals, strategies, schedules, and enforcement actions that would lead the state into compliance with all federal air quality standards. Changes to the compliance schedule or plan must be incorporated into the SIP, which outlines measures by which the state can attain the NAAQS for criteria pollutants. Areas not in compliance with a standard can be declared nonattainment areas by the EPA and/or the appropriate state or local agency.

Table 3-3. Air Emissions Inventory for Kirtland AFB

Source Category	Emissions (tons/year)							
	VOCs	HC	CO	NO_x	SO_x	PM_{10}	HAPs	TSP
Transient alert aircraft	NA	56.0	129.0	14.5	3.0	NA	NA	1.5
Assigned aircraft	NA	133.0	180.5	35.5	4.0	NA	NA	2.0
Aerospace ground equipment	5.2	2.5	44.4	44.4	2.88	3.0	0.0	3.1
Commercial heating plant	NA	0.5	1.5	9.5	5.0	NA	NA	0.5
Domestic heating	NA	2.0	4.5	20.0	0.5	NA	NA	1.0
Emergency power production	NA	0.5	1.0	4.5	0.5	NA	NA	0.5
Military vehicles	NA	18.0	166.0	18.0	0.5	NA	NA	2.5
Privately owned vehicles	NA	189.0	1,755.5	187.5	7.5	NA	NA	25.0
Jet and helicopter testing	19.0	NA	26.1	33.0	5.9	0.75	5.8	0.75
Landfill mulcher	1.1	NA	2.84	13.2	0.87	7.6	0.0	7.6
External/internal combustion	1.7	NA	22.6	30.7	8.0	2.8	0.0	3.4
Degreasers/solvent cleaners	3.5	NA	3.0	0.0	0.0	0.0	0.10	0.0
Miscellaneous chemical usage	49.2	NA	0.0	0.0	0.0	0.0	4.92	0.0
Storage tanks	11.9	NA	0.0	0.0	0.0	0.0	0.82	0.0
Traffic on unpaved roads	0.0	NA	0.0	0.0	0.0	58.6	0.0	58.6
Surface coating paint booths	4.2	NA	0.0	0.0	0.0	0.43	1.8	0.96
Explosive ordnance disposal and testing	0.2	NA	31.0	4.5	0.0	46.0	0.05	46.0
Fuel evaporation losses (dispensing and fuel loading racks)	33.8	90.0	30.0	0.0	0.0	0.0	1.09	0.0
Total	129.8	491.5	2,397.9	415.3	38.6	119.2	30.78	153.4

Source: USAF, 1993 and Kirtland AFB, 1996

Notes: VOC = Volatile Organic Compounds
HC = Hydrocarbons
CO = Carbon monoxide
NO_x = Nitrogen oxides
SO_x = Sulfur oxides
PM_{10} = Particulate Matter less than 10 microns in
HAPs = Hazardous Air Pollutants
TSP = Total Suspended Particulates

3.3 NOISE

3.3.1 Definition of Resource

Noise is defined as unwanted sound or, more specifically, sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying (Federal Interagency Committee on Noise [FICON], 1992). Human response to noise varies according to the type and characteristics of the noise source, distance between the noise source and the receptor, sensitivity of the receptor, and time of day.

Due to wide variations in sound levels, sound is measured in decibels (dB), which is a unit of measure based on a logarithmic scale (e.g., 10-dB increase corresponds to a 100 percent increase in perceived sound). Under most conditions, a 5-dB change is necessary for noise increases to be noticeable to humans (EPA, 1973). Sound measurement is further refined by using an A-weighted decibel scale (dBA) that emphasizes the range of sound frequencies that are most audible to the human ear (between 1,000 and 8,000 cycles per second).

A noise-sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors may also include noise-sensitive domestic animals or wildlife species.

A day-night average sound level (DNL) is a noise metric which averages A-weighted sound levels over a 24-hour period, with an additional 10-dB penalty added to noise events occurring between 10:00 p.m. and 7:00 a.m. This penalty is intended to compensate for generally lower background noise levels at night and the annoyance of nighttime noise events. DNL is the preferred noise metric of the US Department of Housing and Urban Development (HUD), US Department of Transportation, FAA, EPA, Veterans' Administration, and DoD. HUD uses guidelines established by FICON to determine acceptable levels of noise exposure for various types of land use (table 3-4).

Table 3-4. Recommended Land Use for DNL - Based Noise Zones[1]

Land Use	Noise Zones		
	Zone I (DNL < 65)	Zone II (DNL 65-75)	Zone III (DNL > 75)
Residential	Acceptable	Generally unacceptable[2]	Unacceptable
Manufacturing	Acceptable	Acceptable	Acceptable[3]
Transportation communication, and utilities	Acceptable	Acceptable	Acceptable
Trade	Acceptable	Acceptable	Acceptable[3]
Public services	Acceptable	Generally unacceptable[2]	Unacceptable
Cultural, recreational, and entertainment	Acceptable	Generally unacceptable[2]	Unacceptable
Agricultural	Acceptable	Acceptable	Acceptable
Livestock farming and animal breeding	Acceptable	Acceptable	Unacceptable

Source: FICON, 1992.

Notes: (1) DNL is the dBA level averaged over a 24-hour period.

(2) Use is generally discouraged; however, if allowed, sound attenuation techniques should be required.

(3) For an DNL level above 75 dBA, sound attenuation techniques should be required.

Ambient background noise in urbanized areas typically varies from 60 to 70 dBA but can be higher; suburban neighborhoods experience ambient noise levels of approximately 45 to 50 dBA (EPA, 1978). Table 3-5 identifies noise levels associated with common indoor and outdoor activities and settings. Table 3-5 and also identifies subjective human judgment of noise levels, specifically the perception of noise levels doubling or being halved.

Table 3-5. Sound Levels of Typical Noise Sources and Environments

Noise Source (at a given distance)	A-Weighted Sound Level Scale (dBA)	Noise Environment	Human Judgment of Noise Loudness[1]
Military Jet Take-off with After burner (50 ft)	140		Above Threshold of Pain
Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
Commercial Jet Take-off (200 ft)	120		Threshold of Pain
Pile Driver (50 ft)	110	Rock Music Concert	32 times as loud 16 times as loud
Ambulance Siren (100 ft)	100		Very Loud
Newspaper Press (5 ft)			8 times as loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	4 times as loud
Prop. Plane Flyover (1,000 ft)		Printing Press Plant	
Diesel Truck, 40 mph (50 ft)			
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	2 times as loud
Passenger Car, 65 mph (25 ft)			Moderately Loud
Living Room Stereo (15 ft)	70		
Vacuum Cleaner (3 ft)			
Electronic Typewriter (10 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	1/2 as loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban	Quiet
		Ambient Sound	1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible
	10		Threshold of Hearing
	0		

Source: EPA, 1978.
Notes: [1]Relative to a reference loudness of 70 dBA

3.3.2 Existing Conditions

Localized sources of noise in the area, both on and off base, include military and civilian aircraft operations at Albuquerque International Sunport and vehicle traffic at Kirtland AFB. The proposed actions assessed in this EA would have no

effect on aircraft noise, but it is nevertheless mentioned because commercial and military aircraft operations at Albuquerque International Sunport are the primary sources of background noise in the area. The Albuquerque International Sunport requires that all aircraft implement certain noise abatement procedures.

These procedures include restricted use of runways for aircraft at certain times and restrictions of time and locations of night engine runups. Airport officials also conduct noise monitoring at certain sites and monitor land use patterns for compatibility with city of Albuquerque Land Use Guidance.

Traffic at Kirtland AFB constitutes a relatively small, localized source of noise. Gibson Boulevard is the roadway most frequently used for accessing the base and would be used for both projects. From a small sample of observations in the vicinity of Kirtland AFB, it was noted that the peak traffic volumes entering and exiting the base through the Gibson gate occur between the hours of 6:30 a.m. and 8:00 a.m., and between the hours of 4:00 p.m. and 5:30 p.m.

Traffic noise on Gibson Boulevard results in a 65-dBA DNL contour estimated to be about 750 ft from the roadway centerline (Military Traffic Management Command, 1993). The Ira Sprecher gate on the south that joins up with Southgate Road could also be an access point to the small arms and rifle range or the septic system renovation area.

3.4 LAND USE

3.4.1 Definition of Resource

Land use is the classification of either natural or human-modified activities occurring at a given location. Natural land use includes rangeland and other open or undeveloped areas. Human-modified land use classifications include residential, commercial, industrial, communications and utilities, agricultural, institutional, recreational, and other developed areas. Land use is regulated by management plans, policies, regulations, and ordinances (e.g., zoning) that determine the type and extent of land use allowable in specific areas and protect specially designated or environmentally sensitive areas.

3.4.2 Existing Conditions

In the vicinity of Kirtland AFB, land use varies from urban to open rangeland. Kirtland AFB is bordered on the north and west by the city of Albuquerque and its suburbs and on the south by the Isleta Pueblo, with the Cibola National Forest bordering the east. Immediately north of the installation, land use is predominantly urban. Open spaces and forestland are present northeast of the base. West of Kirtland AFB, land use is a mixture of urban areas and open space. South of the installation, the Isleta Pueblo lands are generally open space and forest or vacant land.

3.4.2.1 Kirtland AFB Land Use

Kirtland AFB currently provides support for a variety of missions that include every primary mission traditionally fulfilled by the USAF, as well as many specialized activities less common to other Air Force bases. In particular, Kirtland AFB is one of the nation's leading research, development, test, and evaluation facilities, and more than three-fourths of the over 52,000 acres comprising Kirtland AFB is devoted to these activities. Kirtland AFB is among the largest bases (land area) owned by the USAF.

As the host organization at Kirtland AFB, the 377th Air Base Wing supports more than 200 associate organizations and provides support for wartime mobility requirements in various critical specialties. The two largest tenants are Sandia National Laboratories New Mexico and Air Force Research Laboratory. Other major tenants include the Air Force Operational Test and Evaluation Center, the Field Command Defense Special Weapons Agency, the Air Force Safety Center, the Air Force Inspection Agency, and the Air Force Security Police Agency.

Kirtland AFB manages a wide variety of land ownerships and land use agreements with multiple state and federal agencies. The land at Kirtland AFB is primarily owned by the USAF, but several other ownerships and leases apply. The eastern portion of Kirtland AFB is primarily Cibola National Forest land turned over to the USAF by the US Forest Service (USFS). These lands have been withdrawn from public use and are known as the withdrawal area. The US

Department of Energy owns certain areas of the base and leases other areas from the USAF (USAF, 1995a). A buffer zone along the western boundary, known as McCormick Ranch, is USAF land operated by Air Force Research Laboratory (Dow, 1998).

The airfield complex serving Kirtland AFB is shared with Albuquerque International Sunport, located adjacent to the northwest corner of the base. Airfield operations and aircraft support facilities are concentrated in the airfield complex area. The remainder of intensive development at the base (e.g., administrative, housing, medical, and commercial services) is located east of the airfield complex but limited to the northwest corner of the base in the cantonment area. The base golf course and landfill are located approximately 3 miles south of the cantonment area. The remaining areas of the base (approximately 80 percent of the base land area) are largely dedicated to research and development activities, sensitive military uses, and widely spaced industrial development.

The small arms and rifle range will continue that function with the renovations. The sewer line will follow Southgate Road and will be placed in the road shoulder, which is a compatible use with the road.

3.4.2.2 City of Albuquerque Land Use

Kirtland AFB is located southeast of Albuquerque, adjacent to the Albuquerque International Sunport. Residential areas in the north and east sections of Albuquerque contain both single-family and multi-family dwellings. These neighborhoods include public and private grade schools and public parks. The University of New Mexico, the New Mexico State Fairgrounds, and numerous commercial businesses make up the central business district, which lies adjacent to the north and west boundaries of Kirtland AFB. St. Joseph's, Presbyterian, and Memorial Hospitals are located just west of Kirtland AFB.

Southwest of Kirtland AFB, land is primarily vacant. Montesa Park, which is located within the Tijeras Arroyo, is in this southern section and contains a number of public facilities. Land uses just to the east of the Rio Grande River, which runs north-to-south through the city of Albuquerque, range from vacant

marshland to commercial and industrial areas. West of the Rio Grande River, land uses consist primarily of single-family residential with some commercial and industrial areas. Schools and parks are also located in this area. The southwest section of Albuquerque contains commercial, industrial, and residential land uses, as well as the Rio Grande Zoological Park.

3.5 GEOLOGICAL RESOURCES

3.5.1 Definition of Resource

The geologic resources of an area consist of all soil and rock materials. For the purpose of this study, the terms soil and rock refer to unconsolidated and consolidated earth materials, respectively. The geology of an area includes mineral deposits, notable landforms, tectonic features, and fossil remains.

3.5.2 Existing Conditions

3.5.2.1 Geology

Kirtland AFB is situated in the eastern portion of the Albuquerque Basin, one of the largest of a series of north-trending basins measuring 90 miles long and 30 miles wide (Fenneman, 1931). The basin extends from the gently sloping area near the Rio Grande River to the steep foothills and slopes of the Sandia and Manzanita Mountains. The basin is demarcated to the south by the Socorro Channel, to the north by the Naciemento Uplift, to the west by the Puerco Plateau and Lucero Uplift, and to the east by the Sandia and Manzanita Mountains. The Albuquerque Basin is at its widest point in the Kirtland AFB area and tapers off at its north and south ends. Large-scale faulting which occurred between 11.2 and 5.3 million years ago deepened the basin and tilted the local mountains. As a result, basin deposits (and those at Kirtland AFB) are a mixture of volcanic and sedimentary rocks (Energy Research and Development Administration, 1977). Different landforms within the basin include mesas, benches, stream terraces, low hills, ridges, and graded alluvial slopes (Lozinsky et al., 1991; Kelley, 1977; Kelley and Northrup, 1975). Elevations at Kirtland AFB range from 5,200 ft in the west to almost 8,000 ft in the Manzanita Mountains. Several canyons are found within the boundary of Kirtland AFB. Lurance

Canyon and Sol se Mete Canyon are located in the northeastern portion of the base, near the boundary of the Cibola National Forest in the withdrawal area.

Most of the Albuquerque Basin consists of poorly consolidated sediments that eroded from the surrounding mountains following previous faulting and geologic activity. These sediments, known as the Santa Fe Group, are overlain in places by the 5.3 to 1.6-million- year-old Ortiz Gravel deposits. In certain places, Rio Grande River and volcanic deposits are interspersed.

3.5.2.2 Soils

Dominant soils of the Albuquerque Basin, in which Kirtland AFB is located, are well drained and loamy, with minor amounts of gravelly and stony soils along the mountains and arroyos. A variety of soil associations occur on Kirtland AFB: Gila-Vinton-Brazito association, Bluepoint-Kokan association (the soil type associated with the firing range and the sewer line), Madurez-Wink association, Tijeras-Embudo association, Sies-Orthids association, and Kolob-Rock outcrop association (USDA, 1977). Gila-Vinton-Brazito and Bluepoint-Kokan associations are deep soils on floodplains and dissected terraces. The Bluepoint-Kokan association is composed of nearly level to steep, somewhat excessively drained or excessively drained sandy and gravelly soils on dissected terraces and alluvial fans (USDA, 1977). Each association contains several specific soil series that differ in composition and individual characteristics.

3.6 WATER RESOURCES

3.6.1 Definition of Resource

Water resources include all surface and groundwater within the proposed project area and areas affected by existing and potential runoff, including an area's potential for flooding (100-year floodplains). Surface water resources comprise lakes, rivers, and streams and are important for a variety of reasons including economic, ecological, recreational, and human health. Groundwater comprises the subsurface hydrologic resources of the physical environment and is an essential resource in many areas; groundwater is commonly used for potable water consumption, agricultural irrigation, and industrial applications.

Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition.

Other issues relevant to water resources include areas affected by existing and potential runoff and hazards associated with 100-year floodplains. Floodplains are often belts of low, level ground present on one or both sides of a stream channel and are subject to either periodic or infrequent inundation by floodwater. Inundation dangers associated with floodplains have prompted federal, state, and local legislation that limits development in these areas largely to recreation and preservation activities.

3.6.2 Existing Conditions

3.6.2.1 Surface Water

The Rio Grande River is the major surface hydrologic feature in central New Mexico, flowing north to south through Albuquerque approximately 5 miles west of Kirtland AFB. The East Mesa, on which Kirtland AFB is located, has a west-southwestward ground surface slope from about 250 ft per mile near the mountains to 20 ft per mile near the Rio Grande River. The mesa's width ranges from 3 miles in its northern section to 9 miles in its southern section. Minor surface water bodies exist on the East Mesa as small wetlands such as Coyote Springs, Sol se Mete Spring, and Manzano Springs 1 and 2.

East Mesa surface water occurs in the form of stormwater sheet flow that drains into small gullies when it rains. The primary surface channel that drains runoff from Kirtland AFB to the Rio Grande River is the Tijeras Arroyo, a water-carved gully or channel, usually dry for most of the year. Precipitation reaches the Tijeras Arroyo through a series of storm drains, flood canals, and small unnamed arroyos. Surface water enters Tijeras Arroyo where it crosses the northeast corner of Kirtland AFB and then flows south of Albuquerque International Sunport draining eventually into the Rio Grande River (USAF, 1991a).

Tijeras Arroyo flows intermittently during heavy thunderstorms and spring snowmelt (US Army Corps of Engineers [USACE], 1979a). However, nearly 95

percent of the precipitation that flows through the Tijeras Arroyo does not reach the Rio Grande River due to evaporation. The remaining 5 percent is equally divided between runoff and groundwater recharge (USAF, 1991a).

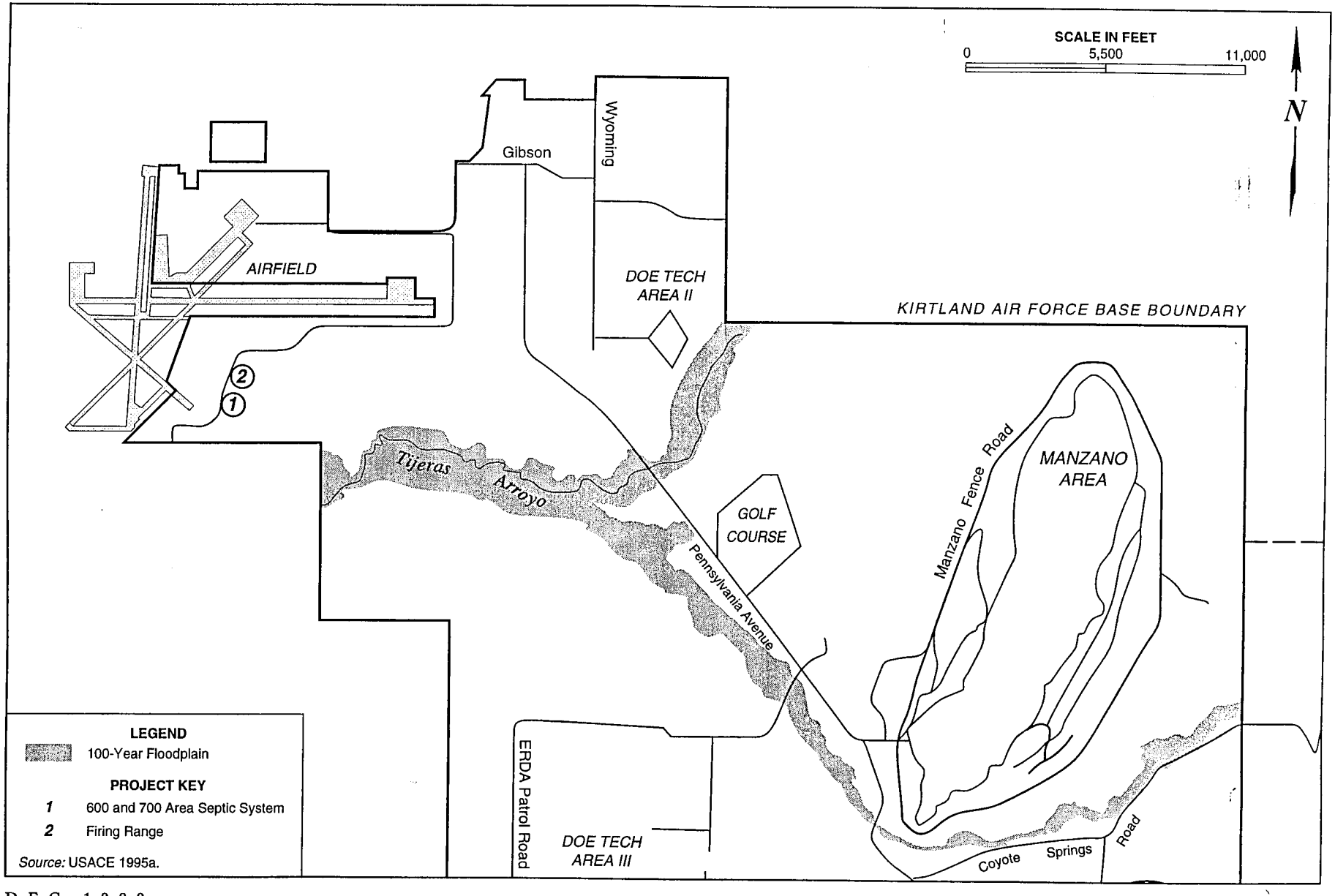
3.6.2.2 Floodplains

Flooding on Kirtland AFB generally occurs between May and October during high-intensity thunderstorms (USACE, 1979b). Tijeras Arroyo and Arroyo del Coyote floods are characterized by high peak flows, small volumes, and short duration. Although flooding occurs infrequently, vegetation can encroach into the arroyos' channel, obstructing the flow of water and causing flooding. A 100-year floodplain encompasses these arroyos and follows their path. The proposed site of the small arms and rifle range renovation project is over 4,500 ft northwest of the Tijeras Arroyo floodplain. The sewer line would intercept an off-base city sewer line just north of this arroyo along Ira Sprecher Drive and this portion of the project would be within the floodplain (figure 3-2).

3.6.2.3 Groundwater

Kirtland AFB is located within the limits of the Rio Grande Underground Water Basin, which has been defined by the state of New Mexico as a natural resource area and has been designated as a "declared underground water basin." The state regulates it as a sole source of potable water. The average depth to groundwater beneath Kirtland AFB is 450 to 550 ft. The Rio Grande Basin's source of groundwater is the Santa Fe Aquifer. The volume of recoverable fresh groundwater in the Rio Grande Basin is estimated at 2.3 billion-acre ft.

Albuquerque relies on groundwater as its sole potable water source. The municipal water system of Albuquerque has a total city system capacity of 289 million gallons per day (gpd); the current city usage is less than 40 percent of the total city system capacity. A localized change in the direction of flow of the regional groundwater beneath Kirtland AFB has occurred due to Albuquerque's extensive water pumping. Recharge of the Santa Fe Aquifer is most likely to



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100-Year Floodplain on Kirtland Air Force Base

FIGURE 3-2

occur east of the installation in the Manzanita Mountains where the sediment material favors rapid infiltration (USAF, 1991a).

The US Geological Survey (USGS) performed a study in 1993-1994 to provide an understanding of the Albuquerque basin groundwater supply. Public supply, industrial, and military requirements (Kirtland AFB) in the Albuquerque area are primarily met by groundwater supply. Recent studies indicate that the most productive zone of the aquifer system is much less extensive than was formerly assumed. Water level declines, greater than those predicted by hydrologic investigations in the early 1960s have occurred in the basin. Nonpumping water levels in production wells in the city have declined more than 100 ft in recent years (USGS, 1999). The city of Albuquerque Water Conservation Office (CAWCO) cites the USGS 1993 study and notes that water levels have dropped as much as 160 ft since 1960 (CAWCO, 1997). In the fall of 1994 the city developed a comprehensive water policy that targets a 30 percent reduction in use through conservation. This plan was adopted in March 1995 with a goal of reducing water use per person by 30 percent from 250 to 175 gpd by 2004 (CAWCO, 1998).

3.7 Biological Resources

3.7.1 Definition of Resource

Biological resources include native, naturalized, or introduced plants and animals and the habitats in which they occur. Protected species are defined as those listed as threatened, endangered, or proposed, or candidate for listing by the US Fish and Wildlife Service (USFWS); New Mexico Energy, Minerals, and Natural Resources Department (NMEMNRD); and/or New Mexico Department of Game and Fish (NMDGF). Federal species of concern, formerly known as candidate category 2 species, are not protected by law; however, these species could become listed, and therefore are considered when addressing biological resource impacts of an action. The New Mexico Natural Heritage Program (NMNHP) also maintains a listing of threatened or endangered species. NMEMNRD holds the responsibility for identifying and listing sensitive plant species considered in this analysis. Animal species of special concern to the NMDGF are also considered.

Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the Endangered Species Act and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitats).

Jurisdictional wetlands are those subject to regulatory authority under Section 404 of the Clean Water Act (CWA) and EO 11990. Wetlands are defined by the USACE (Federal Register, 1982) and EPA (Federal Register, 1980) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR § 328.3(b), 1984).

3.7.2 Existing Conditions

Kirtland AFB lies at the intersection of 4 major North American physiographic and biotic provinces: the Great Plains, Great Basin, Rocky Mountains, and Chihuahuan Desert. Vegetation and wildlife found within Kirtland AFB are influenced by each of these provinces, the Great Basin being the most dominant. The project sites were visited by a qualified biologist in March 1999 and were evaluated for impact concerns.

3.7.2.1 Vegetation

The vegetation scheme at Kirtland AFB consists of 4 main plant communities: grassland, pinyon-juniper, ponderosa, and riparian/wetland/arroyo. Transitional areas are found between these communities and contain a mixture of representative species from the bordering areas. The pinyon-juniper and grassland are the dominant vegetative communities at Kirtland AFB. The riparian/wetland/arroyo community is confined to isolated areas inundated by surface water during at least some part of the year.

The grassland community represents almost half of the vegetation coverage on Kirtland AFB. It occurs between elevations of 5,200 and 5,700 ft in the

southwestern and north-central portions of Kirtland AFB and mostly represents the species present along the proposed sewer line. Shrubs representative of the grassland community found along the sewer line route included winter fat (*Eurotia lanata*), four-wing saltbush (*Atriplex canescens*), broom snakeweed (*Gutierrezia sarothrae*), soapweed yucca (*Yucca glauca*), and big sagebrush (*Artemisia tridentata*). Other grassland associated species found along the sewer route include the buffalo gourd (*Curcurbita foetidissima*) and club cholla (*Opuntia clavata*). The noxious weed, white horsenettle (*Solanum elaeagnifolium*), was also found along the route. The small arms and rifle range does not have vegetation associated with the planned disturbance. Primary grass species found along the route during a May 1999 survey include ring muhly (*Muhlenbergia torreyi*) and Indian ricegrass (*Oryzopsis hymnodies*).

Other species found along the sewer route associated with a transitional zone from grassland to pinyon-juniper include the desert marigold (*Baileya multiradiata*), Mormon tea (*Ephedra trifurca*), antelope sage (*Eriogonum jamesii*), Fendler spurge (*Euphorbia fendleri* var. *chaetocalyx*), verbenas (*Verbena* spp.), prairie sunflower (*Helianthus petiolaris*), whitestem stickleaf (*Mentzelia albicaulis*), and prairie evening primrose (*Oenothera albicaulis*).

3.7.2.2 Wetlands

The USACE Albuquerque District delineated wetlands on Kirtland AFB, including a description of waters of the US regulated pursuant to Section 404 of the CWA, and a restatement of the location of the 100-year floodplain determined in a 1979 study (USACE, 1995). (Floodplains are discussed in Section 3.6, Water Resources). There are no wetlands or riparian areas within the vicinity of the proposed project areas.

3.7.2.3 Wildlife

Wildlife communities at Kirtland AFB are typical of woodland and grassland types of habitat with the central New Mexico region.

Common birds associated with the grassland association at Kirtland AFB include horned lark (*Eremophila alpestris*), scaled quail (*Callipepia squamata*), mourning

dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californianus*), American crow (*Corvus brachyrhynchos*), northern mockingbird (*Mimus polyglottos*), crissal thrasher (*Toxostoma crissal*), lark sparrow (*Chordestes grammacus*), black-throated sparrow (*Amphispiza bilineata*), western meadowlark (*Sturnella neglecta*), brown-headed cowbird (*Molothrus ater*), and house finch (*Carpodacus mexicanus*).

The birds of prey, or raptors, most commonly found in the grassland association include northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), prairie falcon (*F. mexicanus*), barn owl (*Tyto alba*), long-eared owl (*Asio otus*), and great horned owl (*Bubo virginianus*). A common scavenger in this habitat type is the turkey vulture (*Cathartes aura*).

The grassland association has a mammal community dominated by rodents, rabbits, and hares. These include the desert cottontail (*Sylvilagus audubonii*), Gunnison's prairie dog (*Cynomys gunnisoni*), white-footed deer mouse (*Peromyscus maniculatus*), silky pocket mouse (*Perognathus flavus*), Merriam's kangaroo rat (*Dipodomys merriami*), and the northern grasshopper mouse (*Onychomys leucogaster*). Mammalian predators found in the grassland association include the coyote (*Canis latrans*), badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), striped skunk (*Mephitis mephitis*) and bobcat (*Lynx rufus*).

A limited variety of reptiles and amphibians are found within the grassland association. May of these species have extensive periods of dormancy during dry conditions and rapid breeding cycles when temporary ponds occur after rains. Reptiles and amphibians found on Kirtland AFB include the following: Woodhouse's toad (*Bufo woodhousei*), Great Plains toad (*B. cognatus*), western box turtle (*Terrapene ornata*), whiptail lizard (*Cnemidophorus* spp.), lesser earless lizard (*Holbrookia maculata*), and the western diamondback rattlesnake (*Crotalus arrox*).

Many of the same grassland species extend into the woodland association at Kirtland AFB. Other than those mentioned above, amphibians are generally absent from this type of community due to the lack of standing water, which drains rapidly through the sandy soils.

3.7.2.4 Threatened and Endangered Species

Sixteen state and federally listed species could occur in Bernalillo County. Several state and federally listed species have the potential to occur on Kirtland AFB or within the withdrawal area. Federally threatened and endangered species are largely protected under the Endangered Species Act. In New Mexico, threatened and endangered animal species are protected by the New Mexico Wildlife Act. The New Mexico Energy, Mineral, and Natural Resources Department maintains listings of state threatened and endangered plants, which are protected under the New Mexico Endangered Plant Species Act. In May 1999, a biologist determined that no sensitive animals, plants, or habitats occur within the proposed sewer line, septic tanks, and small arms and rifle range project areas. Table 3-6 lists species found in Barnalillo County and their potential for occurring on base (the location of the sewer line, septic tanks, and proposed action firing range sites) or in the withdrawal area (the location of the alternative firing range site).

Of the sixteen species listed for Bernalillo County, 7 of these species could not occur on Kirtland AFB or in the withdrawal area due to habitat restrictions. The federally endangered Rio Grande silvery minnow (*Hybognathus amarus*) is found only within its proposed critical habitat in the Rio Grande River. The state threatened neotrophic cormorant (*Phalacrocorax brasilianus*) is attracted to large water bodies, such as Elephant Butte Reservoir in Sierra County, south of Kirtland AFB (NMDGF, 1998). Farther to the north, the neotrophic cormorant is only found along the Rio Grande River. No large water bodies that could attract neotrophic cormorants are located at Kirtland AFB. The state threatened common black-hawk (*Buteogallus anthracinus anthracinus*) occupies dense, well-developed riparian corridors along permanent streams and rivers (NMDGF, 1998). These habitats contain the necessary prey base to support this bird species. Surface drainages at Kirtland AFB are sporadic and do not contain water year round; therefore, well-developed riparian areas are not found at Kirtland AFB. The Bell's vireo (*Vireo bellii*) a state threatened bird, prefers riparian habitats similar to that of the common black-hawk. This species prefers dense riparian corridors along permanent grassland streams (NMDGF, 1998). Permanent streams are not present within the grasslands at Kirtland AFB. Lack of adequate riparian habitat also precludes the federally endangered

Table 3-6. Special Status Species, Bernalillo County

Common Name	Scientific Name	Status	Occurrence at KAFB	Occurrence Within Withdrawal Area	Habitat	Season	Behavior
FISH							
Rio Grande silvery minnow	*Hybognathus amarus*	FE, SE, PCH	No	No	AQ	AY	Breeds
BIRDS							
neotrophic cormorant	*Phalacrocorax brasilianus*	ST	No	No	R, AQ	SP, SM	Breeds
bald eagle	*Haliaeetus leucocephalus*	FT, ST	Potential	Potential	G, PJ, P	SP, F	Transient
common black-hawk	*Buteogallus anthracinus anthracinus*	ST	No	No	R	SM	Breeds
whooping crane	*Grus americana*	FE, SE	No	No	G, R, AQ	W	Transient
mountain plover	*Charadrius montanus*	PT	Potential	No	R	SP, SM	Breeds
Mexican spotted owl	*Strix occidentalis lucida*	FT, CH	Potential	Potential	PJ, P	AY	Transient, breeds in summer
white-eared hummingbird	*Hylocharis leucotis borealis*	ST	No	Potential	P	SM	Transient
southwestern willow flycatcher	*Empidonax traillii extimus*	FE, SE, CH	No	No	R	SP, SM, F	Breeds
Bell's vireo	*Vireo bellii*	ST	No	No	R	SM	Breeds
gray vireo	*Vireo vicinior*	ST	Potential	Yes	PJ	SP, SM	Transient, breeds in summer
Baird's sparrow	*Ammodramus bairdii*	ST	Potential	No	G, PJ	F	Transient
MAMMALS							
black-footed ferret	*Mustela nigripes*	FE	No	No	G, PJ	AY	Breeds
spotted bat	*Euderma maculatum*	ST	No	Potential	R, PJ, P	SM	Transient
New Mexican jumping mouse	*Zapus hudsonius luteus*	ST	Potential	No	R	AY	Breeds
PLANTS							
Great Plains ladies'-tresses orchid	*Spiranthes magnicamporum*	SE	No	Potential	R, PJ	AY	Grows

Sources: NMDGF 1998, NMDGF 1999, NMEMNRD 1999, NMNHP 1998, USFWS 1999.

Notes:

FE = Federal Endangered
FT = Federal Threatened
C = Federal Candidate
SE = State Endangered
ST = State Threatened
S = Federal Sensitive
PCH = Proposed Critical Habitat
CH = Critical Habitat
G = Grassland
PJ = Pinyon/Juniper
P = Ponderosa
R = Riparian
AY = All Year
SP = Spring
SM = Summer
F = Fall

southwestern willow flycatcher (*Empidonax trailii extimus*) from occurring at Kirtland AFB. During a survey for southwestern willow flycatchers conducted from 1994 to 1996, this species was discovered in riparian habitat along the Rio Grande River near Albuquerque, but not at Kirtland AFB (USAF, 1998a).

The federally endangered whopping crane (*Grus americana*) is only known in New Mexico from three experimental populations. The populations that migrate through New Mexico primarily travel to the shores of the Gulf of Mexico (NMDGF, 1998). These birds are known to frequent riparian and aquatic habitats along the Rio Grande River, but are not known to occur at Kirtland AFB. The federally endangered black-footed ferret (*Mustela nigripes*) could occur within a 50-mile radius of Kirtland AFB, but it has never been reported in the area (USAF, 1991a). Black-footed ferrets occupy large prairie dog towns. Although habitat suitable for black-footed ferrets is present at Kirtland AFB, this species is presumed to be extirpated from Bernalillo County (NMDGF, 1998).

Nine of the threatened or endangered species listed for Bernalillo County occur, or have the potential to occur, at Kirtland AFB or in the withdrawal area. Brief descriptions of these species are provided below.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*), a federally threatened species, is endemic to North American and is the only North American representative of the fish or sea eagles. The bald eagle prefers aquatic or riparian habitats, but requires a large area to support its prey base. Prey is primarily fish, small mammals, or carrion. In winter, bald eagles congregate in areas that are close to open water and offer good perch trees and night roosts (USAF, 1998a). The bald eagle could be found at Kirtland AFB as a fall or spring transient in grassland, pinyon-juniper, and ponderosa pine habitats.

Mountain plover

The mountain plover (*Charadrius montanus*), recently proposed for federal listing as threatened, forages on insects and occupies short-grass prairies and prairie dog towns. Mountain plovers breed in New Mexico and spend their winters

primarily in California (USAF, 1998a). These birds were once known to breed in Bernalillo County, but now may be extirpated from the county (NMDGF, 1998). There is an historical record (period from 1864 to 1994) of mountain plovers breeding in northeast Bernalillo County and a 1995 nest site just north of there in Sandoval County. Records also show one or more mountain plover nest sites in Santo Domingo Pueblo (southeast Sandoval County) (Klingel, 1999). Results of a 1995 survey suggested that the species may be more numerous and widespread than expected, however, they were not found to inhabit Kirtland AFB (USAF, 1998a). Although mountain plovers have never been observed on Kirtland AFB, their distribution range is nearby and appropriate habitat occurs on base.

Mexican spotted owl

The federally threatened Mexican spotted owl (*Strix occidentalis lucida*) forages on small to medium-sized rodents and primarily inhabit unmanaged, closed canopy forests dominated by conifers. In New Mexico, Mexican spotted owls occur in mixed conifer forests, ponderosa pine (*Pinus ponderosa*) forests, rocky canyons, and associated riparian forests (USAF, 1998a). Habitat ideal for Mexican spotted owls occurs in the withdrawal area's ponderosa pine vegetation community and in the pinyon-juniper woodland along the border of the withdrawal area and the base. These owls have the potential to occupy these areas. Mexican spotted owls are known to inhabit the Manzanita and Sandia mountains, which are very near Kirtland AFB (NMDGF, 1998).

White-eared hummingbird

The white-eared hummingbird (*Hylocharis leucotis borealis*) is a state-threatened bird that inhabits montane habitats in New Mexico. It is found primarily within pine and pine-oak forests. These birds are aggressive and feed primarily on insects and flowers. The ponderosa pine habitat in the withdrawal area contains ideal habitat for white-eared hummingbirds. This species has been listed as a transient in the Sandia and Manzanita mountains and the potential exists for it to inhabit Kirtland AFB in the withdrawal area (NMDGF, 1998).

Gray vireo

The gray vireo (*Vireo vicinior*) is a state threatened species known to occur in the withdrawal area. In 1993 and 1994, New Mexico Natural Heritage Program (NMNHP) personnel found gray vireos during a threatened and endangered species survey of Kirtland AFB and the withdrawal area (NMNHP, 1995). According to the survey report (NMNHP, 1995), gray vireos were found in ungrazed juniper woodland at the base of the western foothills of the Manzanita Mountains in an elevational belt of 5,900 to 6,600 ft. These birds occur primarily in areas with a somewhat open canopy. Most of the vireos were observed in the withdrawal area, with few occurring in the easternmost portion of the base. In the withdrawal area, gray vireos were found in open juniper grassland/savannah habitat, along cobbly hillsides, and dry washes of juniper-dominated mesas. During the summer, the withdrawal area has the largest gray vireo colony in New Mexico (Schwarz, 1998).

Baird's sparrow

The state threatened Baird's sparrow (*Ammodramus bairdii*) is a migrant in New Mexico that occurs primarily in the eastern plains and southern lowlands. It may winter in some areas of the state, but usually winters in Mexico (NMDGF, 1998). This species occupies desert grasslands and feeds primarily on seeds and insects. Due to the large amount of grassland habitat at Kirtland AFB and the transient behavior of this species, it may occur on base.

Spotted bat

The spotted bat (*Euderma maculatum*) is found in New Mexico from the Rio Grande valley westward where it occupies various habitats including riparian areas, pinyon-juniper woodlands, and ponderosa pine forests – often near cliffs (NMDGF, 1998). Since these habitat types are found in the withdrawal area, the spotted bat could be found here. A specimen of this state threatened species has been collected in the city of Albuquerque, adjacent to Kirtland AFB. Records of spotted bats in New Mexico were all documented during warmer months. While a number of specimens have been collected throughout New Mexico,

evidence suggests that the animals were en route to winter quarters (NMDGF, 1998).

New Mexican jumping mouse

The state threatened New Mexico jumping mouse (*Zapus hudsonius luteus*) is known to occur in the central Rio Grande valley and has been documented near Isleta and Belen, south of Kirtland AFB. This mouse prefers wetland and riparian habitats with permanent moisture and vegetation such as grasses, sedges, and forbs. This species is known to inhabit cattail (*Typha latifolia*) stands and areas with high soil moisture (NMDGF, 1998). Several of the small wetlands at Kirtland AFB are fed by springs that provide permanent moisture to these sites. If the proper vegetation is present, the New Mexican jumping mouse may occur in these areas.

Great Plains ladies'-tresses orchid

The Great Plains ladies'-tresses orchid (*Spiranthes magnicamporum*) is common to the Great Plains, but rare in New Mexico. This state endangered orchid has been reported in Bernalillo County and is found in moist, riparian areas of pinyon-juniper woodlands (NMEMNRD, 1999). This plant may be found in riparian habitat in the withdrawal area and Kirtland AFB.

3.8 TRANSPORTATION AND CIRCULATION

3.8.1 Definition of Resource

Transportation and circulation refer to the movement of vehicles throughout a roadway network. Roadway operating conditions and the capacity of the system to accommodate vehicles are described in terms of volume-to-capacity (V/C) ratio, which is a comparison of average daily traffic (ADT) volume to roadway capacity (table 3-7). The V/C ratio corresponds to a Level of Service (LOS) rating, ranging from free-flowing traffic conditions (LOS "A") for a V/C of less than 60 percent, to congested "stop-and-go" conditions (LOS "F") for a V/C at or near 100 percent.

Table 3-7. Level of Service and Volume-to-Capacity Ratio Descriptions

LOS	Quality of Traffic Operation	V/C Ratio
A	Free flow. Very good.	<0.60
B	Stable flow. Good.	0.61 - 0.70
C	Approaching unstable flow. Poor.	0.71 - 0.80
D	Unstable flow. Very poor.	0.81 - 0.90
E	Forced flow. Approaching failure.	0.91 - 1.00
F	Long delays. Failure.	≥1.00

Source: Highway Capacity Manual, Highway Research Board Special Report 209, National Academy of Services, Washington, DC

3.8.2 Existing Conditions

3.8.2.1 Local Road Network

The Kirtland AFB lies about 4 miles east of Interstate 25 and 2 miles south of Interstate 40. Principal access to the cantonment area is provided by Wyoming Boulevard on the north, Gibson Boulevard on the west, and Eubank Boulevard on the east. These boulevards link directly with the surface street grid system of southeast Albuquerque although no limited access expressways serve the base directly.

Much of the region's peak traffic occurs inbound (toward central Albuquerque) in the morning and outbound (away from the central area) in the afternoon. Traffic tends to be especially heavy near the junction of the interstate highways and at arterial intersections with the interstates. Significant congestion in the area is greatest during morning and afternoon peak hours on major arterials and surface streets where urban conditions, such as high vehicle volumes and signalized intersections, tend to slow traffic.

3.8.2.2 Access Gates

Access to Kirtland AFB is gained through the 6 entrance/exit gates. The Carlisle, Truman (at San Mateo Boulevard), and Gibson (at Louisiana Boulevard) gates provide access to the installation from the west and north along Gibson

Boulevard. The installation can be accessed from the south through the gate at Ira Sprecher Drive, which is closest to the project sites. The gates at Eubank and Wyoming Boulevards provide access to Kirtland AFB from the east and north, respectively.

3.8.2.3 Circulation at Kirtland AFB

Traffic flows at a relatively smooth pace in the western portion of the cantonment area due to light traffic volumes and favorable intersection operations. A greater portion of the base population is located in the eastern portion of the cantonment area where most of the housing is located, and many signalized intersections have been installed to control the large amount of traffic. Traffic problems on Kirtland AFB generally occur during peak traffic periods when Wyoming Boulevard, Gibson Boulevard, and Pennsylvania Avenue (north of Hardin Boulevard) become heavily congested. Staggered work schedules and other measures have been implemented to help alleviate traffic congestion. One-way streets have been established in heavily congested areas to minimize problems encountered during peak traffic periods. The proposed project sites are well south of the heavily traveled areas of the base.

The base landfill is located east of Pennsylvania Avenue and Tijeras Arroyo. Unpaved roads link Pennsylvania Avenue with the landfill site. Transport of material from the project sites to the base landfill would likely follow Southgate east to Hardin Boulevard, then Pennsylvania Avenue south to the landfill access.

3.8.2.4 Traffic Volumes

No recent counts of traffic volume are available for base roads; however, traffic counts for roads in the vicinity of the base have been prepared by the Middle Rio Grande Council of Governments (1996) (table 3-8). Because the base is the largest employer in the Albuquerque area, Kirtland AFB is the principal destination for commuters in the southern side of the city. As a result, traffic tends to converge on the base gates with high ADT volumes and occasionally poor LOS ratings.

Table 3-8. Average Daily Traffic Volumes and Levels of Service

Roadway	Roadway Capacity	ADT[a]	LOS[b]
Gibson Blvd.			
1-25 to Carlisle Blvd.	50,400	44,300	D
Carlisle Blvd. to San Mateo Blvd.	50,400	39,600	C
San Mateo Blvd. to Louisiana Blvd.	50,400	29,800	A
Carlisle Blvd.			
Gibson Blvd. to Central Avenue	26,400	7,000	A
Central Avenue to Lomas Blvd.	12,000	10,500	D
San Mateo Blvd.			
Gibson Blvd. to Central Avenue	28,800	28,700	F
Central Avenue to I-40	43,200	41,700	E
Louisiana Blvd.			
Gibson Blvd. to Central Avenue	36,000	21,200	A
Central Avenue to I-40	36,000	27,200	C
Wyoming Blvd.			
Central Avenue to I-40	43,200	32,700	C
Central Avenue to Wyoming Gate	43,200	22,900	A
Eubank Blvd.			
South of Central Avenue	28,000	14,000	A
Central Avenue to I-40	43,200	26,300	B
I-40 to Menaul Blvd.	43,200	39,000	D
Central Avenue			
Carlisle Blvd. to San Mateo Blvd.	43,200	32,200	C
San Mateo Blvd. to San Pedro Blvd.	43,200	37,900	D
San Pedro Blvd. to Louisiana Blvd.	36,000	33,600	E
Louisiana Blvd. to Wyoming Blvd.	43,200	35,500	D
Wyoming Blvd. to Eubank Blvd.	43,200	35,300	D
Eubank Blvd. to I-40	43,200	27,400	B
Interstate 40			
I-25 to Louisiana Blvd.	84,000	150,000	F
San Mateo to Louisiana Blvd.	126,000	154,700	F
Louisiana Blvd. to Wyoming Blvd.	126,000	131,700	F
Wyoming Blvd. to Eubank Blvd.	126,000	107,100	D
Eubank Blvd. to Central Avenue	126,000	78,300	B

Source: Middle Rio Grande Council of Governments, 1996

Notes: [a] ADT is defined as the number of vehicles in a 24-hour period.

[b] Level of Service (from Highway Capacity Manual, Highway Research Board Special Report 209, National Academy of Services, Washington, DC).

3.9 VISUAL RESOURCES

3.9.1 Definition of Resource

Visual resources are defined as the natural and manufactured features that constitute the aesthetic qualities of an area. These features form the overall impression that an observer receives of an area (i.e., its landscape character). An area's susceptibility to visual impacts is related to visual sensitivity. Highly sensitive resources include national and state parks, recreation areas, historic sites, wild and scenic rivers, designated scenic roads, and other areas specifically noted for aesthetic qualities.

3.9.2 Existing Conditions

The visual environment at Kirtland AFB is characteristic of military and civilian airfields. Structures include hangars, maintenance and support facilities, and navigational equipment. The area surrounding the installation predominantly varies from urban to open rangeland. Open spaces and forestland are to the northeast and east. South of the installation, the Isleta Pueblo lands are generally open space, forests, or vacant land. The proposed project sites are either already present or are compatible with the surrounding visual environment.

3.10 CULTURAL RESOURCES

3.10.1 Definition of Resource

Historic properties (i.e, significant cultural resources) are classified as buildings, structures, objects, sites, or districts. A building is created to shelter any form of human activity. A structure is distinguished from a building in that it is a construction designed for purposes other than creating human shelter. Objects are constructions that are primarily artistic in nature or are relatively small and simply constructed. A site is the location of a significant event, a prehistoric or historic activity, or a building or structure whose location possess value. A district is a concentration or linkage of buildings, structures, objects, or sites that are united historically or aesthetically by plan or development.

Criteria for establishing significance are set forth in Title 36 CFR Part 60.4. Procedures for applying the National Register evaluation criteria are found in various National Park Service bulletins. These bulletins provide guidelines so that reliable decisions concerning significance, integrity, and treatment can be made.

3.10.2 Existing Conditions

More than 300 historic and prehistoric cultural resources have been recorded on Kirtland AFB. These include historic buildings, structures, and sites dating from European contact, circa (ca) AD 1540, through the Cold War, ca AD 1945-1991. Prehistoric sites dating from the Paleo-Indian Period to the Pueblo Period have been recorded.

The Archaeological Records Management Section (ARMS), which includes the New Mexico Cultural Resource Information System and the State Archaeological Records Repository, was accessed to determine if any previous surveys had been completed within the project boundaries and to determine if any known cultural resources exist within the project boundaries. The records indicate that no previous surveys have been completed and that no significant cultural resources are known to exist within the project boundaries.

At least nine archaeological surveys or site evaluations have been completed near the current project area. The nine known projects are: (1) a 4,828-acre survey completed by the Center of Anthropological Studies (Rogers, 1978); (2) a survey conducted outside the base boundaries by the University of New Mexico (Doleman, 1989); (3) a site evaluation (Laboratory of Anthropology (LA) 71432) conducted by TRC Mariah (Cushman, 1989); (4) a survey by Peyton (1992); (5) an 18-acre survey completed by TRC Mariah (Evaskovich, 1993); (6) a survey (Installation Restoration Project [IRP]) completed in 1993 by TRC Mariah (Acklen and Evaskovich, 1997); (7) a survey completed by Chambers Consultants and Planners (Hoagland and Lord, 1993); (8) a survey conducted by Advance Sciences, Inc. (Knight, 1993); and (9) a survey conducted by TRC Mariah during 1992 and 1993 (Larson et al, 1998).

Eight archaeological sites were recorded within a 1-mile radius of the present project. Included are LA Nos. 38140, 38141, 38142, 71432 (Land Fill [LF]-18), 99781, 103162, 103164, and 103165.

LA 38140 is located 1200 ft (366 meters [m]) south of the proposed project area on the middle terrace of the north slope of Tijeras Arroyo. The site consists of a probable prehistoric quarry of unknown age (Rogers, 1978; Hoagland and Lord, 1993).

LA 38141 is located 1600 ft (488 m) southeast of the proposed project area on the middle-terraced north slope of Tijeras Arroyo. The ARMS Site Record long form indicates the site contains waste flakes from the manufacture of stone tools. Neither the age nor the number or nature of the artifacts are listed in the records (Rogers, 1978; Hoagland and Lord, 1993).

LA 38142 is located 2400 ft (732 m) south of the proposed project area within the middle terrace of the north slope of Tijeras Arroyo. The ARMS Site Record long form indicates the site contains waste flakes from stone tool manufacture. Neither the age nor the number or nature of the artifacts are listed (Rogers, 1978; Hoagland and Lord, 1993).

LA 71432 (LF-18) is located within the project area, on the upper terraced north slope of Tijeras Arroyo. The site has been recorded in the course of at least two previous inventories (Cushman, 1989; Acklen and Evaskovich, 1997).

LA 99781 site is located 2640 ft (805 m) north of the proposed project in a developed area of the base north of the east-west runway. The site consists of a disturbed scatter of historic artifacts that measures 50 m north-south by 125 m east-west. The site was recorded as part of Phase III site documentation conducted by Mariah and Associates (Larson et al, 1998).

LA 103162 is located 4960 ft (1512 m) south east of the proposed project area on a low rise south of Tijeras Arroyo. The site consists of a sparse stone artifact scatter that was described as a quarry (Larson et al., 1998).

LA 103164 is located 4400 ft (1342 m) southeast of the proposed project area. The site is partially exposed in an eroded cut of the south face of a drainage within Tijeras Arroyo. The site consists of a 40 ft (12.2 m) long charcoal-stained soil deposit with one metate fragment and a possible hearth (Larson et al., 1998).

LA 103165 is located 3920 ft (1195 m) southeast of the proposed project area. The site is partially exposed in an eroded cut of the west face of a drainage within Tijeras Arroyo. The site consists of a 33 ft (10 m) long by up to seven ft (2.2 m) thick deposit of charcoal–stained soil deposit with no observed artifacts. The deposit is thought to represent a hearth (Larson et al., 1998).

An inventory archaeological survey of the current project area was completed on March 9, 1999 (Sullivan, Schilz, and O'Byrne, 1999). The entire area, including all of the proposed sewer pipeline corridors, was surveyed using transect intervals not greater than 15 m (45 ft). No significant cultural resources were discovered during the survey. There is, however, a potential for buried cultural resources along the sewer pipeline segment south of Southgate Avenue and east of Cell Drive.

The small arms and rifle range facility (Buildings 707, 708, 709, and 710) was evaluated on March 19, 1999. Each building was visited, photographed, and described (Sullivan, Schilz, and O'Byrne, 1999).

The small arms and rifle range was originally built in 1941. The buildings are a combination of concrete masonry unit block, and balloon wood frame construction with pressboard or stucco. The various construction methods and media reflect alterations that have taken place since their original construction.

The buildings do not display distinctive architectural characteristics or construction methods, nor are they associated with a specific important moment in history or with the lives of persons significant in our past.

3.11 SOCIOECONOMICS

3.11.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population, housing, and economic activity. Economic activity encompasses employment, personal income, and economic growth. Impacts on these fundamental socioeconomic components can also influence other issues such as housing availability and public service provision.

In 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), was issued to ensure that disproportionately high and adverse human health or environmental effects on minority and low-income communities are identified and addressed. In order to provide a thorough environmental justice evaluation, particular attention is given to the distribution of race and poverty status in areas potentially affected by implementation of the proposed actions.

3.11.2 Existing Conditions

The area surrounding Kirtland AFB ranges from urban to unpopulated wilderness. Albuquerque, the largest city in New Mexico, is adjacent to the base on the northwest; the 1997 population of Albuquerque was 400,000 people (Best, 1998; University of New Mexico, 1997). Other surrounding communities are considerably smaller. A total of 606,446 people reside in communities within 50 miles of Kirtland AFB, including several Native American pueblos (US Department of Commerce, 1993).

Kirtland AFB's host and associates comprise the largest single employer in New Mexico and have a major economic impact on the surrounding communities: organizations at Kirtland AFB currently employ 29,787 people (USAF, 1998b). It has been estimated that Kirtland AFB's annual economic contribution to the Albuquerque metropolitan area exceeds $2.0 billion (USAF, 1998b).

3.11.2.1 Population

In 1997, the Albuquerque metropolitan statistical area (MSA), which includes Bernalillo, Sandoval, and Valencia counties, had an estimated population of more than 673,900. In 1996, the population of Bernalillo County was 528,000, or about 31 percent of New Mexico's total population, estimated at more than 1,723,800. Out of 486,560 adults, 52 percent are female and 48 percent are male. The median age of adults in the Albuquerque MSA is 41.0 years (Albuquerque Publishing, 1997). In 1998, there were 7,949 births and 3,796 deaths in the city of Albuquerque, reflecting a natural increase of 4,153 people (City of Albuquerque Planning Department [CAPD], 1999).

Between 1990 to 1994, the population of the Albuquerque MSA grew at a rate of 7.1 percent (Albuquerque Economic Development, 1996). The area grew at an average annual rate of 2.4 percent during the 1980s and 3.1 percent during the 1970s. From 1990 to 1995, the total population growth in Bernalillo County was 8.7 percent. Bernalillo County is expected to grow from 528,000 in 1996 to 550,000 in 2001, reflecting a growth rate of 4.2 percent. By the year 2020, the population of the city of Albuquerque is expected to reach 543,630 and Bernalillo County is expected to reach 679,538 (CAPD, 1999). People moving to New Mexico come primarily from California, Texas, Arizona, Colorado, Florida, and New York. Most of the city's growth is forecasted to occur west of the river and in the northeast quadrant. The West Side Area population increased 97 percent from 49,040 during the 1980 Census to 96,815 during the 1990 Census (Albuquerque Publishing, 1997).

New Mexico has the highest proportion of Hispanics (40 percent) of any state in the nation. The white population fell from 52.6 percent of the 1980 total to 50.4 percent in 1990. In 1996, the black population accounted for 2 percent of the total, the Asian population accounted for 1 percent, and other populations accounted for 5 percent (Albuquerque Publishing, 1997).

3.11.2.2 Job Growth and Unemployment

Kirtland AFB plays an important role in the economy of the Albuquerque metropolitan area; the base is the largest employer in New Mexico. In 1997,

Kirtland AFB had 5,600 military employees and 5,400 civilian employees (Albuquerque Publishing, 1997). The goods and services purchased by base employees in the local area create secondary jobs and wages, further adding to the total economic importance to the local area. The economic contribution of Kirtland AFB to the Albuquerque area has been estimated to exceed $2.0 billion (USAF, 1998b).

Nonagricultural employment in the Albuquerque MSA can be broken down into the following sectors: Government, 18.9 percent; Trade, 24.0 percent; Services, 31.3 percent; Construction and Mining, 6.7 percent; Manufacturing, 9.1 percent; Transportation and Public Utilities, 4.7 percent; and Finance, Insurance and Real Estate, 5.3 percent. The total increase in nonagricultural jobs from 1995 to 1996 was 1.7 percent. The highest percent change in number of jobs from 1995 to 1996 occurred in the Communications and Public Utilities industry (part of the Transportation and Public Utilities sector), which experienced a 14.6-percent increase from 5,500 to 6,300 (Albuquerque Publishing, 1997). The unemployment rate in the Albuquerque MSA decreased from 6.9 percent in 1993 to 4.7 percent in 1997; this rate is slightly above the national average of 4.5 percent in 1997 (Albuquerque Publishing, 1997). The unemployment rate for the Albuquerque MSA in 1998 was 4.6 percent (CAPD, 1999). As of February 1999, 350,475 people were employed out of an estimated civilian labor force of 365,624 for the Albuquerque MSA; this reflects an unemployment rate of 4.1 percent (CAPD, 1999).

In 1996, the per capita personal income for the Albuquerque MSA was $22,353. The per capita personal income for Bernalillo County and New Mexico in 1996 was $23,779 and $18,814 respectively (CAPD, 1999). All of these figures are below the US average per capita personal income for that year ($25,298) (CAPD, 1999). The median household income in the Albuquerque metropolitan area for 1997 was $36,300. The Effective Buying Income (EBI) is defined as that amount of income available after taxes to purchase goods and services. In 1997, the median household EBI for Albuquerque MSA was $32,400. This is slightly above the median EBI for the mountain region ($31,000), which includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. In 1996, the total EBI for the Albuquerque MSA was $10,140,800; this is projected

to increase 29 percent to $13,074,700 by the year 2001 (Albuquerque Publishing, 1997).

3.11.2.3 Kirtland AFB

Kirtland AFB expenditures in fiscal year (FY) 1998, including payroll, amounted to more than $1.4 billion. Total economic impact from the annual operating expenditures from Kirtland AFB was estimated to be over $2.0 billion. Table 3-9 provides additional information relating to the economic impact of Kirtland AFB activities on the local community (USAF, 1998b).

Table 3-9. Local Economic Impact, Kirtland AFB, 1997

Category	Amount	
Payroll		
Military Payroll	$167,110,086	
Federal Civilian Payroll	$214,230,812	
Other Civilian/Contractor Payroll	$651,084,184	
Total Annual Payroll		**$1,032,425,082**
Total Annual Retiree Payroll	$198,420,000	
Annual Expenditures in the Local Community		
Construction Projects	$39,030,211	
Local Service Contracts	$40,550,007	
Local Procurement (Supplies, Equipment & Materials)	$318,321,548	
Total Annual Expenditures		**$397,901,766**
Total Estimated Annual Dollar Value of Jobs Created		**$576,648,750**
Total: Annual Economic Impact Estimate		**$2,006,975,598**

Source: USAF, 1998b.

At the end of FY 1998, Kirtland AFB employed 19,009. The DoD work force reached 8,977, of which 5,468 employees were active duty military and Air National Guard personnel and 3,509 were civilian employees. By the end of FY

1998, the contractor work force at Kirtland AFB totaled 10,032. Total personnel associated with Kirtland AFB in 1998 was 29,787.

3.11.2.4 Housing

In 1990, Bernalillo County contained 201,235 housing units over an area of 1,169 square miles, with 2.28 persons per owner-occupied unit (Sunwest Bank, 1995). During 1993, housing construction in Albuquerque totaled 2,491 new housing units (Sunwest Bank, 1993). As of March 1999, the city of Albuquerque contained 195,770 housing units over an area of 181.4 square miles (CAPD, 1999). The largest percentage of total housing, nearly 63 percent, consisted of single-unit housing; multiple-unit housing accounted for about 32 percent and the remaining 5 percent were mobile homes (CAPD, 1999).

More than 50 percent of Albuquerque's housing inventory has been built since 1970, with less than 4 percent built before 1939. As of March 1999, the price for the average single-family home was $152,350 (CAPD, 1999). Approximately 68,000 apartment units are leased with an average month's rent of about 68 cents per-square-foot. The vacancy rate for apartments was 7.5 percent at the end of 1995 (Sunwest Bank, 1995).

By the end of FY 1998, 2,126 military personnel were living in family housing at Kirtland AFB, and 2,346 military personnel were living off base (USAF, 1998b).

3.11.3 Environmental Justice Considerations

In addition to the USAF and other DoD facilities, Kirtland AFB supports a variety of other government and contractor agencies. To evaluate potential impacts to minority and low-income populations as required by EO 12898 (Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations), a 50 mile radius circle centered on Kirtland AFB was overlaid on 1990 census tract maps and population and income characteristics of this area were analyzed.

3.11.3.1 Population

According to the 1990 census, there were 606,446 persons living within 50 miles of Kirtland AFB. Whites comprised 55 percent of the population, Hispanics comprised 37 percent of the population, and Native Americans accounted for just over 4 percent of the total population in the 50-mile radius. The census showed that approximately half of the Native Americans resided on reservations. Blacks, Asians, Pacific Islanders, and other racial groups totaled less than 4 percent of the population in 1990 (Bureau of Business and Economic Research, 1995).

Most of the population within the 50-mile radius of Kirtland AFB resides in various cities, towns, and Census Designated Places. In 1990, Albuquerque was the most populated community, with 384,736 persons, or 63 percent of the total population in this area. South Valley, an unincorporated area located immediately southwest of Albuquerque and due west of Kirtland AFB, was the second largest community in the area; Hispanics comprised more than 70 percent of the 35,701 persons living there. Rio Rancho, northwest of Albuquerque in south-central Sandoval County, was third largest community with 32,505 persons.

3.11.3.2 Minority Population

In 1990, virtually every group of residents within the 50 miles of Kirtland AFB had a community where minorities comprised at least 25 percent of the population.

Many towns and villages along the Rio Grande River (north and south of Albuquerque) are comprised primarily of Hispanic residents. The 1990 community populations were as follows: Belen–5,960 (67 percent Hispanic), Bernalillo–5,960 (75 percent Hispanic), Bosque Farms-3,791 (25 percent Hispanic), Corrales-5,453 (27 percent Hispanic), Los Chaves-3,872 (49 percent Hispanic), Los Lunas-6,013 (58 percent Hispanic), Tome-Adelino-1,695 (65 percent Hispanic), and Valencia-3,917 (47 percent Hispanic) (US Department of Commerce [USDC], 1992).

There are also nine primarily Native American communities within 50 miles of Kirtland AFB. Most of the Isleta Reservation's northern boundary coincides with the southern boundary of Kirtland AFB. The Isleta people (population 2,699 in 1990) primarily live near the Rio Grande, several miles from Kirtland AFB. Seven additional reservations, where residents live in dense settlements known as pueblos, are located in the portion of Sandoval County within 50 miles of Kirtland AFB. The 1990 populations of these reservations were as follows: Sandia Pueblo-358, Santa Ana Pueblo-481, San Felipe Pueblo-1,859, Santo Domingo Pueblo-2,947, Cochita Pueblo-666, Zia Pueblo-637, and Jemez Pueblo-1,738. The Cañoncito Navajo Reservation, a satellite of the main Navajo Reservation, is located in the northwest corner of Bernalillo County and had 1,060 residents in 1990 (USDC, 1991).

3.11.3.3 Low-Income Population

In the Albuquerque area, high poverty levels were found primarily in the southern half of the city, with the greatest concentration of low-income persons occurring in South Valley (USDC, 1992). High levels of poverty were found in Native American communities in rural Sandoval County, eastern Cibola County, and western and southern Bernalillo County. Communities characterized by low-income populations include Belen with 28 percent of its population below the poverty level; Bernalillo, 24 percent below poverty level; Los Chaves, 19 percent below poverty level; Los Lunas, 25 percent below poverty level; and Valencia, 15 percent below poverty level (USDC, 1993).

The most notable socioeconomic characteristic of the Native American communities is the large proportion of low-income residents. Based on 1989 incomes, the percentage of persons below the poverty level for each reservation was as follows: Isleta (27 percent), Sandia (19 percent), Santa Ana (13 percent), San Felipe (42 percent), Santo Domingo (34 percent), Cochita (25 percent), Zia (33 percent), Jemez (37 percent) and Cañoncito Navajo Reservation (60 percent) (USDC, 1993).

3.12 ENVIRONMENTAL MANAGEMENT

3.12.1 Definition of Activity

Ongoing efforts to comply with applicable laws and regulations to ensure present and past waste practices are carried out in a manner that protects human health and the environment. These activities are performed under the DoD and Kirtland AFB Environmental Compliance Program and other associated compliance programs. Current environmental activities include the treatment and/or disposal of sanitary sewage, municipal solid waste, and industrial waste including hazardous materials. In addition to managing current environmental concerns, DoD and Kirtland AFB also conduct an IRP that is intended to identify, confirm, quantify, and remediate problems caused by past hazardous waste management and hazardous resource practices at USAF facilities.

Hazardous materials are defined as substances with strong physical properties of ignitability, corrosivity, reactivity, or toxicity which may cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose a substantial threat to human health or the environment. Hazardous wastes are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health or the environment.

Hazardous waste is regulated by the Resource, Conservation, and Recovery Act (RCRA) of 1976 (including the Hazardous Waste and Solid Waste Amendments of 1984) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. In general, CERCLA primarily regulates inactive hazardous waste sites and RCRA regulates current hazardous waste management practices to avoid a future hazardous waste site. RCRA-regulated hazardous wastes are defined in 40 CFR § 261 and may be designated by virtue of characteristic (e.g., corrosivity) or by specific listing in the regulation. Petroleum, oils, and lubricants (POLs) are not by definition a hazardous waste and are typically classified as recyclable materials unless contaminated by a RCRA waste or if the POL fails one of the characteristic tests (e.g, ignitability).

To protect people and habitats from inadvertent and potentially harmful releases of hazardous substances, DoD has dictated that all facilities develop and implement a Hazardous Waste Management Plan, Hazardous Materials Plan, and the Spill Prevention and Response Plan. Furthermore, the IRP facilitates thorough investigation and cleanup of contaminated sites located at military installations. These plans and programs, in addition to established legislation, are intended to protect the ecosystems on which living organisms depend.

3.12.2 Existing Conditions

3.12.2.1 Solid Wastes

Solid waste (municipal waste) from Kirtland AFB is sent to an off-base disposal site at the Cerro Colorado Landfill operated by the city of Albuquerque. Nonhazardous demolition and construction debris is disposed of in the Kirtland AFB Landfill (table 3-10). The state granted an exemption allowing the Kirtland landfill to continue operating without a level "D" permit which would require appropriate liners, monitoring, and other upgrades. The state will monitor annually to ensure it does not become a nuisance (problems at landfills are usually caused by household wastes, which are not put in this landfill, or by illegal dumping). The remaining capacity of the current cell is estimated to be 3 million cubic yards; however, this landfill can now expand as needed (Jacobs, 1999).

Table 3-10. Estimates of Waste Introduced to Kirtland AFB Landfill, 1996, 1997, 1998, and January – September 1999

Units	1996	1997	1998	January – September 1999
Cubic Yards	226,822	102,119	109,125	81,330
Tons	90,729	40,848	43,650	32,532

Source: Kitt, 1999.
Note: Waste estimated at 800 pounds (0.4 tons) per cubic yard.

3.12.2.2 Wastewater

The city of Albuquerque treats most of the sanitary sewage produced by Kirtland AFB. As of 1999, the base is contributing 0.823 million gpd of wastewater to the city facility (Reeder, 1999). Sewage from base installations south of the Tijeras Arroyo is collected in individual septic tanks (USAF, 1991b). Kirtland AFB does not have separate industrial and municipal wastewater systems. An industrial pretreatment program administered by the city of Albuquerque regulates industrial discharges from the base to sewer lines. A city of Albuquerque wastewater permit was reissued to Kirtland AFB in 1997 under the Sewer Usage and Wastewater Control Ordinance, bringing the base's total number of wastewater permits issued by the city to four. Kirtland AFB's permits are issued by the city of Albuquerque's publicly owned treatment works, which is regulated by a National Pollutant Discharge Elimination System (NPDES) permit, in accordance with the CWA. Four manholes located on the base are used to monitor the discharged water quality (USAF, 1990). Kirtland AFB does not have an NPDES industrial discharge permit. All solid wastes are disposed of in accordance with applicable USAF, Kirtland AFB, federal, state, and local regulations.

3.12.2.3 Hazardous Wastes

Although host and associate entities on base produce different types of quantities of hazardous waste, Kirtland AFB as a whole is considered a large quantity generator by the EPA and New Mexico Environment Division. POLs and hazardous waste are collected, stored, and disposed of in accordance with applicable federal, state, and local standards, as described in the base's annually updated management plan. Special guidance documents are followed for the disposal of lead-based paint, asbestos, hydrazine, and radioactive materials, and for the prevention of spills (USAF, 1999a).

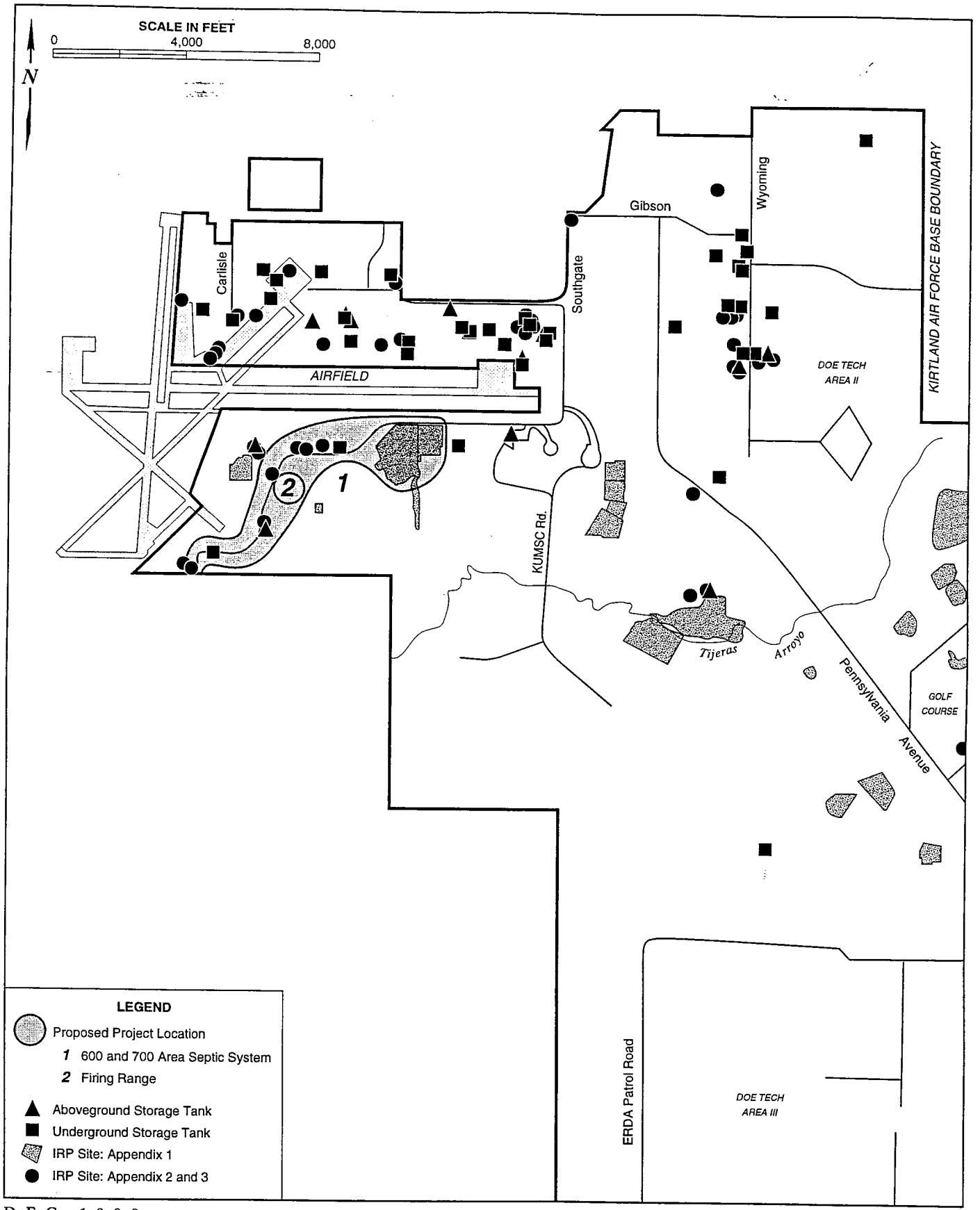
Hazardous wastes generated at Kirtland AFB are associated with operation of industrial shops and research and development laboratories, pesticide and herbicide application, radiological testing, fire control training, and fuel management. Wastes generated by these activities vary from year to year, depending on research activities and mission assignments. Hazardous wastes

generated at the base include POLs, acids (including batteries) and bases, and nonhalogenated solvents and organic compounds. Hazardous wastes that are recycled include surplus chemicals such as halogenated solvents, polychlorinated biphenyls, and silver-bearing photographic materials.

Kirtland AFB operates as a large-quantity generator of hazardous waste and as a treatment, storage, and disposal facility. A RCRA Part B permit issued by the state of New Mexico regulates collection, storage, and disposal of hazardous waste. The treatment, storage, and disposal facility is operated by the Defense Reutilization and Marketing Office, which arranges off-site disposal of the wastes. Some wastes are collected by outside contractors at designated collection points. Photographic laboratory wastes are discharged to sanitary sewers following silver recovery and neutralization. Asbestos and asbestos-containing materials found in numerous buildings at the base are handled in accordance with the Kirtland AFB Asbestos Management Plan (USAF, undated). Lead-based paint is handled in accordance with the Lead-based Paint Management Plan (USAF, 1995b).

The IRP at Kirtland AFB forms the basis for assessment and response action under provisions of CERCLA. As of January 1999, 70 IRP sites and 13 Areas of Concern had been established at the base (DeWitt, 1999) (figure 3-3). IRP sites at Kirtland AFB undergo various phases of investigation and remediation until the status of No Further Action (NFA) is granted by the state. Sites that are deemed NFA pose no risk of contamination to personnel involved with activities associated with the proposed actions and are not discussed further. According to an Environmental Baseline Survey performed at Kirtland AFB in 1999, sites that have not been approved or recommended for NFA are considered active sources of contamination (active IRP sites) (USAF, 1999a). Active IRP sites in the vicinity of the project areas are presented in figure 3-3 and are described below. Sites located outside of the project areas are not discussed in this document.

Site 1: Former Pistol Range. This site includes the former pistol range, an area behind the active pistol range, and a small mound of soil near the active range. The former pistol range is located at the base of a natural sand hill south of the main east-west runway of Albuquerque International Sunport, near the west side of Kirtland AFB. The soil mound is southwest of the active small arms and



DEC 1999

EA

Installation Restoration Program Sites
Kirtland Air Force Base

FIGURE 3-3

rifle range just off Cell Drive. This site is located within the firing range renovation project area. Lead content in soil samples collected at this site ranged from "no detection" to 354 milligrams per kilograms (USAF, 1999a). This site is scheduled for a RCRA Facility Investigation (RFI) and a Corrective Measure Study (CMS) work plan is being developed (USAF, 1999b).

Site 2: Building 617, Waste Accumulation Area. The waste accumulation area at building 617 is located in the Air Force Research Laboratory Chemical Laser Facility, south of the runways in the southwest portion of Kirtland AFB. This site is primarily used to temporarily store 30-gallon double-containment vented drums of waste generated from chemical laser research operations (USAF, 1999a). This site is located within the area proposed for sewer line installation. In 1999, Semi-VOCs and concentrations of benzo(a)pyrene exceeding human health risk-based action levels were found in surface soil samples. Subsurface soil samples revealed limited contamination, with all concentrations below human health risk-based and regulatory action levels (USAF, 1999a). An RFI report is being prepared for this site (USAF, 1999b).

Site 3: Landfill No. 1. This site is located on the west side of Kirtland AFB, south of the main east-west runway, approximately 400 ft south of Albuquerque International Sunport. This site lies north of Tijeras Arroyo and is near the area proposed for sewer line installation. Shallow soil contamination and little or no groundwater contamination was found at this site (USAF, 1999a). A CMS is currently underway for Landfill No. 1 (USAF, 1999b).

SECTION 4
ENVIRONMENTAL CONSEQUENCES

In this section, potential environmental consequences associated with the installation of a sewer line and the rehabilitation and renovation of a small arms and rifle range at Kirtland Air Force Base (AFB) in Albuquerque, New Mexico (the proposed actions) are examined for environmental and human resource impacts. Additionally, alternatives to these actions, and the No-Action Alternatives are also examined. Changes to the natural and human environment are evaluated relative to the existing environmental conditions described in Section 3. For each environmental component, anticipated direct and indirect effects are assessed quantitatively and qualitatively, considering both short-term (e.g., construction-related) and long-term (i.e., operations-related) project effects, as well as for the cumulative effects of other planned actions on the base. The potential for significant environmental consequences was evaluated using the context and intensity considerations defined in the Council on Environmental Quality Regulations on Implementing the National Environmental Policy Act Procedures (40 Code of Federal Regulations [CFR] Part 1508.27).

4.1 HUMAN HEALTH AND SAFETY

4.1.1 Significance Criteria

An impact to safety is considered significant if implementation of an action would substantially increase risks associated with mishap potential or safety relevant to the public or the environment. For example, if implementation of an action would render existing base facilities incompatible with safety criteria (e.g., runway protection zones [RPZs] or explosive safety zones), safety impacts would be significant. A disproportionate adverse increase in environmental health or safety risks to children would be considered significant.

4.1.2 Impacts

Potential changes to safety resulting from this action were determined by overlaying the project sites on maps showing the explosive safety zones and RPZs present on the base. Potential impacts to children are typically analyzed

by: (1) identifying and describing hazards associated with the proposed action that could affect children, (2) examining the effect this action could have on children, (3) assessing the significance of potential impacts, and (4) providing measures to mitigate potentially significant impacts.

4.1.2.1 Sewer Line Project

Proposed Action

Implementation of the proposed action would not adversely impact safety at Kirtland AFB even though one septic tank (for building 750) is in an explosive safety zone. The newly constructed sewer line would also occur within this zone. Otherwise, no other project areas fall within an explosive safety zone. These zones would only preclude construction of facilities above ground in these areas and would not keep construction workers from working on the septic tanks or installing the underground sewer system. Therefore, the explosive safety zones would not be an issue for this project. The sewer line travels through the RPZ at the end of the runway but complies with the RPZ construction restrictions (e.g., no violation of height restrictions because the line will be underground) so this area will not be affected by the proposed action.

Contractors would be required to comply with all applicable occupational health and safety regulations and would work in a manner that would not pose risks to personnel at or near the construction site.

Children are not typically associated with the facilities considered under the proposed action; therefore, they would not be disproportionately affected by this action.

Septic System Replacement

Implementation of this alternative would not change the current safety environment at Kirtland AFB even though one septic tank (for Building 750) is in an explosive safety zone as described for the proposed action. All other septic system sites are not located in an explosive safety zone or RPZ.

Contractor personnel would be responsible for compliance with all applicable occupational health and safety regulations and would be required to conduct construction activities in a manner that would not pose any risks to personnel at or near the construction site.

Children are not typically associated with the facilities considered under the proposed action and so they would not be disproportionately affected by this action. Therefore, possible disproportionate impacts to children (Executive Order [EO] 13045) would not occur.

No-Action Alternative

Selection of the No-Action Alternative would result in continued use of the aging septic system. These systems would be maintained as required by permit and would not pose a safety risk. The tanks are all concrete tanks, and should not corrode under Kirtland AFB's conservative maintenance schedule.

4.1.2.2 Firing Range Renovation

Proposed Action

The buildings proposed for renovation are not located within an explosive safety zone or RPZ. Therefore, neither explosive safety zones nor RPZs will be an issue for this project.

Firing range renovation activities would replace overhead and downrange baffles, add elevation to the embankment behind the range, remove lead contamination from Building 707 and the range, and make improvements to stormwater flow. All of these improvements would be beneficial to human health and safety in the area.

Contractor personnel would be required to comply with all applicable occupational health and safety regulations and would be required to conduct renovation activities in a manner that would not pose any risks to personnel at or near the project site.

Children are not typically associated with the firing range facility and they would not be disproportionately affected by any of these actions. Therefore, an increase in environmental health and safety risks to children (EO 13045) would not occur.

Use of the M-60 Range On-Base

The M-60 Range is not within any explosive safety zones or RPZs. Therefore, the use of this range would not affect these land uses, nor be affected by them. The shooting direction of this range is down into Frustration Canyon, southeast toward the installation boundary. The 1,000 meter impact area has a 7,000 foot mountain as a backstop which effectively stops any rounds from leaving the area. The impact area has a newly defined safety fan that has been coordinated with other groups that use the area. The area would be checked before firing begins, and the gate at the top of the mountain would be closed to prevent anyone from wandering into the area. Coordination with the 58th Special Operations Wing helicopter training, the Marines, the National Guard, Army Reserve Engineering Detachment, Department of Energy Sandia Laboratories, and the horse stable would prevent conflict during training exercises, although the available time for these exercises might be limited. Personnel using the range would be bussed in from an established parking area to prevent damage to personal vehicles from the rough road, and because there is not enough parking available at the facility for the anticipated number of vehicles. Therefore, no change in the safety environment is expected from the use of this range.

Children are not typically associated with this firing range facility and they would not be disproportionately affected by any of these actions. Therefore, an increase in environmental health and safety risks to children (EO 13045) would not occur.

No-Action Alternative

Under this alternative, the firing range would continue to need baffle upgrades for human health and safety reasons and to meet increased safety requirements of new ammunition now being developed. The accumulated lead dust in the

indoor firing range (Building 707) poses a health hazard to occupants and renders this facility unusable. Under the No-Action Alternative, this building would remain locked and marked as a lead hazard. Lead round contamination would persist and continue to accumulate on the range and in the backstop, posing a health hazard to range personnel and decreasing the remaining life of the firing range. With the No-Action Alternative, this firing range would have approximately three years remaining in its useful life. After that, the facility would be closed and a project would be initiated to remove the lead and restore the site.

4.1.3 Other Future Actions on the Base

The proposed actions do not pose safety risks, therefore, they would not contribute to any cumulative safety risks posed by any other projects.

4.2 Air Quality

4.2.1 Significance Criteria

The 1990 amendments to the Clean Air Act (CAA) require federal agencies to conform to the affected State Implementation Plan (SIP) with respect to achieving and maintaining attainment of National Ambient Air Quality Standards (NAAQS) and addressing air quality impacts. An air quality impact resulting from a proposed action would be significant if it would: (1) increase concentrations of ambient criteria pollutants or ozone precursors to levels exceeding NAAQS, (2) increase concentrations of pollutants already at nonattainment levels, (3) lead to establishment of a new nonattainment area by the governor of the state or the United States (US) Environmental Protection Agency (EPA), or (4) delay achievement of attainment in accordance with the SIP.

4.2.2 Impacts

Under the CAA, new stationary sources that are proposed for areas are subject to the requirements of the Prevention of Significant Deterioration (PSD) regulations. The PSD regulations require new stationary sources with emissions

of criteria pollutants above 250 tons per year, or 100 tons per year for specific source categories, to conduct an air quality impact analysis and demonstrate compliance with Best Available Control Technology requirements. Under the CAA Amendments Title V Operating Permits Program, all sources in attainment areas with emissions of criteria pollutants above 100 tons per year must obtain a federal operating permit. The PSD/Title V major source threshold of 100 tons per year for attainment pollutants was used to evaluate the proposed action's significance for air quality impacts, in accordance with the requirements of 40 CFR § 51.853.

A conformity applicability analysis is required to determine whether a federally proposed action is subject to requirements for a conformity determination under EPA's General Conformity Rule. The initial step in determining applicability of the General Conformity Rule is to compare projected pollutant emissions with baseline emissions (40 CFR § 51.853[b]). Conformity determinations are conducted to ensure that NAAQS would not be exceeded and that the proposed action would comply with all federal and state air quality regulations, goals, and plans. The threshold limits to determine if a conformity determination should be accomplished are identified in 40 CFR § 93.153. If the area is designated nonattainment for a pollutant, but the proposed action's emissions would not exceed the de minimis threshold and would be less than 10 percent of the total emissions budget for the region, a record of non-applicability is prepared.

Under Section 176(c) of the CAA, a framework is provided to ensure that federal actions conform to appropriate state or federal implementation plans. Before a federal agency or department engages in, supports, finances, licenses, permits, or approves any activity, that agency must ensure that such actions conform to the applicable implementation plan. According to the 1990 CAA amendments, the purpose of an air quality implementation plan is to eliminate or reduce the severity and number of violations of NAAQS and achieving expeditious attainment of these standards. Federal actions must not conflict with the implementation plan by causing or contributing to any new violation, increasing the frequency or severity of any existing violation, or delaying timely attainment of a standard or required interim milestone. If the proposed actions do not conform to the SIP, they cannot be approved or allowed to proceed.

For all regulated emission sources in nonattainment areas, direct and indirect emissions of criteria pollutants (and precursors to those pollutants) must be calculated. Mobile, area, and stationary, as well as construction-phase emissions sources must be considered. All emissions are calculated in tons per year. The CAA conformity rule states that only net emissions must be considered.

The 1990 CAA amendments require conformity analyses for actions potentially affecting air quality in nonattainment and maintenance areas. If total direct and indirect emissions are estimated to exceed emissions thresholds, a conformity determination is required. The calculation of total direct and indirect emissions does not have to make specific reference to conventional emission source categories (i.e., stationary, area, and mobile sources). The total direct and indirect emissions of criteria pollutants attributable to the proposed action (e.g., ozone precursors) must be considered. Ozone precursors include reactive organic gases and nitrogen oxides, particulate matter less than 10 microns in diameter, and carbon monoxide (CO). Indirect emissions that must be considered are limited to emissions that could be practicably controlled.

The greater Albuquerque area, including Kirtland AFB, is in attainment for all NAAQS, although the area was recently reclassified from nonattainment to maintenance status for CO. As a result, CO emissions are still being tracked. The EPA defines an action as regionally significant when that action contributes at least 10 percent of a nonattainment area's total emissions for any criteria pollutant.

4.2.2.1 Sewer Line Project

Proposed Action

Construction activities would have a minor temporary impact on air quality in the project vicinity due to increased dust and vehicular emissions. Associated construction activities would be expected to generate short-term increases in particulate matter from soil disturbance and a minor, short-term increase in CO emissions from diesel-fired, internal combustion engines on construction equipment. Dust control is required for sites affecting more than 0.75 acres and would occur at this site. Long-term impacts to air quality associated with the

proposed action would not occur since there would not be an increase in vehicular traffic. Table 4-1 identifies CO emissions that would occur under the sewer line installation activities. These values are shown in tons per year and pounds per year for comparison purposes. The emissions of CO expected from construction (0.17 tons per year) are well below the 10 percent de minimis threshold for significance (10 tons per year) for the air basin and, therefore, would not be considered regionally significant. Neither a conformity analysis nor a formal conformity determination would be required. Construction-related impacts to air quality would be minor and temporary.

Septic System Replacement

Removal and replacement of the septic system would result in a minor, temporary impact on air quality in the vicinity of the 600 and 700 buildings and would be similar to, or less than, that described for the proposed action and summarized in table 4-1. As a result, these impacts would be minor and temporary in nature. This alternative would, therefore, be exempt from the need to conduct any further conformity analysis or formal conformity determination for reasons described under the proposed action.

No-Action Alternative

Selection of the No-Action Alternative would result in no change to air quality at Kirtland AFB because no construction would be required.

4.2.2.2 Firing Range Renovation

Proposed Action

Renovation (e.g., recontouring the berms) activities would have a minor temporary impact on air quality in the vicinity of the project site due to increased dust and vehicular emissions. The lead dust removal activities would be contained as required by regulation and would not pose an air quality hazard. Construction activities associated with renovation would be expected to generate short-term increases in particulate matter from soil disturbance and a

Table 4-1. Carbon Monoxide Emissions Generated Under the Sewer Line Proposed Action During Installation

Categories	CO Emission Factors [a]	Total CO Emissions	
	lbs/hr	lbs/yr	tons/yr
Contractor Owned Vehicles[b]	1.50	45.00	0.02
Wheeled Tractor	3.59	107.70	0.05
Wheeled Loader (Backhoe)	0.57	34.20	0.02
Off-Highway Truck (Dump truck, Wheeled dozer) [b]	1.79	125.30	0.04
Miscellaneous (e.g., generators and trenchers)	0.68	76.16	0.04
Total		388.36	0.17

Albuquerque/Bernalillo County Standard [c]	200,000	100
EPA Standard [d]	200,000	100

Notes:

[a] Emission factors for heavy-duty, diesel-powered construction equipment were obtained from the *Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources, AP-42, Fifth Edition*, Office of Air Quality Planning and Standards, Office of Air and Radiation, EPA, January 1995.

[b] Calculation of the Contractor Owned Vehicles Category was calculated using the USAF Air Conformity Applicability Model for 5 contractor-owned vehicles commuting to the base using a 30-mile round trip.

[c] The Off-Highway Truck (Dumptruck) category includes CO emissions from the wheeled dozer.

[d] Standard obtained from Ambient Air Quality Standards and Air Quality Control Regulations for Albuquerque/Bernalillo County, Albuquerque – Bernalillo County Air Quality Control Board, January 1995 Compilation.

40 CFR 93.153(B)(1) - Carbon Monoxide Standard for Non-Attainment Areas

lbs/hr = pounds per hour

lbs/yr = pounds per year

tons/yr = tons per year

Assumptions:

The work week for each of the categories of equipment was calculated for one piece of equipment running 7 hours a day for 5 days a week for two weeks. Although the project may take several months to complete, the amount of CO emitted by all equipment is combined as if all construction project activities occurred concurrently.

minor, short-term increase in CO emissions from diesel-fired, internal combustion engines on construction equipment (table 4-2). The emissions for CO expected from the construction (0.14 tons per year) are well below the 10 percent de minimis threshold for significance (10 tons per year) for the air basin. Dust control is required for sites affecting more than 0.75 acres and would occur at this site. As a result, these impacts would be minor and temporary in nature. Long-term impacts to air quality associated with the proposed action would not occur since there would not be an increase in vehicular traffic.

Emissions associated with the proposed action would meet de minimis requirements and would not be considered regionally significant. This project would, therefore, be exempt from the need to conduct any further conformity analysis or formal conformity determination.

Use of the M-60 Range On Base

No renovation would be required if the M-60 Range is used, and no other emissions would be generated. Range users would have to travel 21.5 miles round trip from the current firing range by bus. Due to scheduling conflicts at the M-60 Range, it was assumed for air quality calculations that the bus trip would be made once a day for only half of the weekdays during a 50-week year. This would add up to 125 trips per year, at a diesel bus average CO emission of 0.114 pounds per mile and would amount to 0.15 tons per year of added CO emissions. This amount is well below the de minimis requirements for the air basin.

No-Action Alternative

Selection of the No-Action Alternative would result in no change to air quality at Kirtland AFB because no renovation would be conducted.

Table 4-2. Carbon Monoxide Emissions Generated Under the Firing Range Proposed Action During Renovation

Categories	CO Emission Factors [a]	Total CO Emissions	
	lbs/hr	lbs/yr	tons/yr
Contractor Owned Vehicles[b]	3.00	45.00	0.02
Track-Type Tractor (CAT)	0.35	10.50	0.01
Wheeled Tractor	3.59	21.54	0.01
Motor Grader	0.15	2.70	0.01
Wheeled Loader (Backhoe)	0.57	15.96	0.01
Off-Highway Truck (Dump truck, wheeled dozer) [b]	1.79	107.40	0.05
Miscellaneous (e.g., generators and trenchers)	0.68	61.20	0.03
Total		264.30	0.14

Albuquerque/Bernalillo County Standard [c]	200,000	100
EPA Standard [d]	200,000	100

Notes:

[a] Emission factors for heavy-duty, diesel-powered construction equipment were obtained from the *Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources, AP-42, Fifth Edition,* Office of Air Quality Planning and Standards, Office of Air and Radiation, EPA, January 1995.

[b] Calculation of the Contractor Owned Vehicles Category was calculated using the USAF Air Conformity Applicability Model for 10 contractor-owned vehicles commuting to the base using a 30-mile round trip.

[c] The Off-Highway Truck (Dumptruck) category includes CO emissions from the wheeled dozer.

[d] Standard obtained from Ambient Air Quality Standards and Air Quality Control Regulations for Albuquerque/Bernalillo County, Albuquerque – Bernalillo County Air Quality Control Board, January 1995 Compilation.

40 CFR 93.153(B)(1) - Carbon Monoxide Standard for Non-Attainment Areas

lbs/hr = pounds per hour

lbs/yr = pounds per year

tons/yr = tons per year

Assumptions:

The work week for each of the categories of equipment was calculated for one piece of equipment running 7 hours a day for 5 days a week for two weeks. Although the project may take several months to complete, the amount of CO emitted by all equipment is combined as if all construction project activities occurred concurrently.

4.2.3 Other Future Actions on The Base

Although analyses of the other future actions on the base are still on-going, the combined emissions from the proposed actions, when considered with potential emissions from the other four future actions, are not expected to have a significant impact on de minimus levels for CO. Dust from construction and renovation activities would be minimized on the site using water or other control measures as necessary, and is not expected to add significantly to particulates in the local air shed.

4.3 Noise

4.3.1 Significance Criteria

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of a proposed action. Potential changes in the noise environment can be beneficial (i.e., if the action reduced the number of sensitive receptors exposed to unacceptable noise levels is), negligible (i.e., the number of sensitive receptors exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., the number of sensitive receptors exposed to unacceptable noise levels is increased). Noise impacts would be considered significant if health and safety standards would be violated, if sensitive receptors exposed were disproportionately affected or if damage would result to personal property.

4.3.2 Impacts

Land Use guidelines established by the US Department of Housing and Urban Development and based on findings of the Federal Interagency Committee on Noise recommend acceptable levels of noise exposure for various types of land uses. Projected noise impacts from the proposed actions and alternatives were evaluated quantitatively against these acceptable noise levels.

4.3.2.1 Sewer Line Project

Proposed Action

Construction equipment would cause a minor, temporary increase in noise near the project site. Nearby facilities would experience muffled construction noise during the workday. However, noise would occur only during construction, and could be reduced through the use of equipment exhaust mufflers. Noise associated with construction activities would not affect sensitive receptors on or off the base. In addition, the noise environment on base is dominated by commercial and military aircraft overflight. Noise associated with construction activities would be comparatively minor and would occur in a relatively remote area of the base.

Septic System Replacement

Implementation of this alternative would cause a minor, temporary increase in noise near the septic system sites resulting from the use of heavy equipment for removal and replacement of the septic system. The nearby facilities would experience muffled construction noise during the workday. However, noise generation would last only for the duration of construction activities, and could be reduced using mitigations as described for the proposed action. Noise produced by construction at the sites would not affect sensitive receptors on or off the base. In addition, the noise environment on base is dominated by commercial and military aircraft overflight. Noise associated with construction activities would be comparatively minor and would occur in a relatively remote area of the base.

No-Action Alternative

No changes to the noise environment would result from selection of the No-Action Alternative because no removal and installation activities would occur.

4.3.2.2 Firing Range Renovation

Proposed Action

Implementation of the proposed action would cause a minor, temporary increase in noise near the project site resulting from the use of heavy equipment for renovation. No facilities are near the firing range; more distant facilities could experience faint, muffled construction noise during the workday. However, noise generation would last only for the duration of construction activities, and could be reduced through the use of equipment exhaust mufflers. Noise produced by construction at the site would not affect sensitive receptors on or off the base. In addition, the noise environment on base is dominated by commercial and military aircraft overflight. Noise associated with renovation activities would be comparatively minor and would occur in a relatively remote area of the base.

Minor beneficial effects to the noise environment would occur from elevation of the embankment surrounding the firing range facility. These modifications would reduce noise levels to the surrounding area.

Use of the M-60 Range On Base

No construction would be required for this alternative. Since the only action would be to use existing facilities, no major change in the noise environment is anticipated, although the M-60 Range would be active more often than it is currently. However, it is isolated from any sensitive receptors or other facilities, so the operational activities at this range would not cause important noise changes in the environment. Infrequent bus travel will occur to and from the M-60 Range but no sensitive noise receptors are found along the route.

No-Action Alternative

No changes to the noise environment would result from selection of the No-Action Alternative because no changes to the facility would occur.

4.3.3 Other Future Actions on the Base

The other future proposed projects would only generate temporary noise from construction and would not affect sensitive receptors. No long-term noise effects are expected from any of these actions. Since the proposed actions would also not have any short-term or significant long-term effects, the cumulative effects of the proposed actions, when considered with potential noise emissions from the other four future actions, are not expected to have a significant impact on the noise environment in the area.

4.4 LAND USE

4.4.1 Significance Criteria

Potential impacts to land use are evaluated by determining if an action is compatible with existing land use and in compliance with adopted land use plans and policies. In general, land use impacts are considered significant if they would: (1) be inconsistent or noncompliant with applicable land use plans and policies, (2) preclude continued use or occupation of an area, or (3) be incompatible with adjacent or nearby land use to the extent that public health or safety is threatened.

4.4.2 Impacts

Potential land use impacts were analyzed by: (1) identifying and describing land uses that could affect or be affected by the project, (2) examining the effect this action may have on the resource, (3) assessing the significance of potential impacts, and (4) providing measures to mitigate potentially significant impacts.

4.4.2.1 Sewer Line Project

Proposed Action

No permanent changes in land use would result from the installation of the sewer line along existing roads, nor from the removal or abandonment of the

septic system. Therefore, no land use impacts are expected from the proposed action.

Septic System Replacement

If a septic system leach field or a septic tank requires a new location, then that land will be dedicated to that use. If the old leach fields and tanks are abandoned in place, those areas will continue to have digging restrictions. However, these areas are not expected to be large in area and will be compatible with the land uses in the area.

No-Action Alternative

The No-Action Alternative would result in no change to land use at Kirtland AFB. Although, the septic system could become a series of holding tanks if the system is allowed to age without upgrade, this would not affect land use in the area.

4.4.2.2 Firing Range Renovation

Proposed Action

There are no changes to land use anticipated to result from the proposed action. The proposed action is for modification of facilities similar to the currently existing facilities in a developed, area of the base. No changes in land use will result from the renovation of the firing range.

Use of the M-60 Range On Base

This range is currently used for machine gun practice on base. It would also include pistol, rifle, and shotgun practice as part of this alternative. The range is for such uses and has been used for such activities in the past. The frequency of these activities for training and qualification requirements can conflict with use of the area by other groups. The 58th Special Operations Wing conducts helicopter sorties in the area. The Marines and the National Guard conduct maneuvers. The Army Reserve Engineering Detachment conducts

accomplishment training, camping, and performs other civil engineering support functions such as building facilities on the range as necessary. The Department of Energy Sandia Laboratories constructs and maintains numerous small facilities scattered throughout the area. People that keep horses at the horse stables like to ride in the hills behind the range. All of these activities are coordinated by the Coyote Range Committee. The increased training at the M-60 Range would require special coordination with this committee to determine how it would impact the other operations. Therefore, this alternative has a potential to impact other land uses in the area. Priorities would have to be set to determine how important each activity is to the overall mission.

No-Action Alternative

The No-Action Alternative would result in no change to land use at Kirtland AFB. However, the small arms and rifle range would continue to deteriorate and would have to be closed in approximately three years.

4.4.3 Other Future Actions on the Base

The proposed actions would not change any land use; therefore, when considered with land use effects of the other four future actions, are not expected to have any significant cumulative impacts to current land use at the base.

4.5 GEOLOGIC RESOURCES

4.5.1 Significance Criteria

An impact to geological resources would be considered significant if implementation of an action would violate a federal, state or local law or regulation protecting geological resources (e.g. unique landforms or rock formations are affected), or result in uncontrolled erosion over a larger area than allowed by regulations.

4.5.2 Impacts

Protection of unique geologic features and minimization of soil erosion are considered when evaluating impacts of a proposed action on geological resources. Generally, such impacts are not considered significant if proper construction techniques and erosion control measures can be implemented to minimize short- and long-term disturbance to soils and overcome limitations imposed by earth resources.

4.5.2.1 Sewer Line Project

Proposed Action

No impacts to regional rock formations would occur from the proposed action. The region's infrequent seismic activity would create no significant threat to construction participants given the use of standard construction procedures for projects of this type.

The predominant soils associated with the proposed project can be erodable so caution would need to be taken during soil-disturbing activities. A Soils Disturbance Permit from the city of Albuquerque is required for projects with greater than 0.75 acres of disturbance; the installation of the sewer line would require this permit. Careful grading and use of accepted soil stabilization methods for all soil disturbance such as the use of water, straw bales, or erosion fences, would keep most of the soil on-site. Therefore, impacts to soils from sewer line installation and septic tank removal are expected to be localized and insignificant.

Septic System Replacement

The septic tanks could be removed or abandoned in place. Their removal could create soil disturbance that could result in erosion. Likewise, if a leach field were removed or a new one installed, soil disturbance during this activity could result in minor erosion. Mitigations during soil disturbance, such as those described for the proposed action, would minimize the effects of erosion on the

site. Therefore, septic system removal or replacement effects on the soil are expected to be localized and insignificant.

No-Action Alternative

Selection of the No-Action Alternative would result in no change to current conditions of geologic resources at Kirtland AFB except that the septic leach fields could become clogged and ineffective. This would result in no further input to the surrounding soils from the septic system (a beneficial impact) and the septic tanks would become holding tanks.

4.5.2.2 Firing Range Renovation

Proposed Action

Under the proposed action, no impacts to regional rock formations would occur. The region's infrequent seismic activity would create no significant threat to renovation participants given the use of standard construction procedures for a facility of this size and type.

The predominant soils associated with the proposed project can be erodable so caution would need to be taken during soil disturbing activities. A Soils Disturbance Permit from the city of Albuquerque would be required for this project because it would disturb more than 0.75 acres. Careful grading and use of accepted soil stabilization methods for all soil disturbance, such as the use of water, straw bales, or erosion fences, would keep most of the soil on-site. Therefore, impacts on soils from facility renovation are expected to be localized and insignificant.

Use of the M-60 Range On Base

No regional rock formation or soil-disturbing activities would be associated with this alternative, except for the side of the mountain being hit with practice rounds. No significant increase in erosion is expected to occur due to this disturbance.

No-Action Alternative

Selection of the No-Action Alternative would result in no change to current conditions of geologic resources at Kirtland AFB. Lead contamination of the backstop soil at the outdoor firing range would continue to accumulate. This accumulation would render the backstop ineffective to stop additional rounds safely after another three years. At this time, the firing range would be closed and no more lead would accumulate in the soil.

4.5.3 Other Future Actions on the Base

No impacts to regional rock formations would occur from implementation of the proposed action or other currently known future actions. The other future proposed projects would also involve some construction, as the proposed actions. Soil erosion control methods would be used in all cases. Therefore, facility construction effects, especially for those disturbing the soil, are expected to be localized and insignificant. The cumulative effects of the proposed actions, when considered with potential disturbance of geological resources from the other future actions, are not expected to have a significant impact on geological resources in the area.

4.6 WATER RESOURCES

4.6.1 Significance Criteria

Criteria for determining the significance of impacts to water resources are based on water availability, quality, and use; existence of floodplains and wetlands; and associated regulations. An impact to water resources would be considered significant if it would: (1) reduce or interfere with water availability to existing users, (2) create or contribute to overdraft of groundwater basins, (3) exceed safe annual yield of water supply sources, (4) adversely affect water quality or otherwise endanger public health, (5) threaten or damage unique hydrologic characteristics, or (6) violate established laws or regulations that have been adopted to protect or manage water resources. Impacts to floodplains are considered significant if a proposed action would alter flow within a floodplain.

4.6.2 Impacts

Potential impacts to water resources typically analyzed by: (1) identifying and describing the effect this action may have on the resource, (2) examining the effect this action may have on the resource, (3) assessing the significance of potential impacts, and (4) providing measures to mitigate potentially significant impacts.

4.6.2.1 Sewer Line Project

Proposed Action

The main project location is over half a mile northwest of the primary surface channel, Tijeras Arroyo, that drains runoff from Kirtland AFB to the Rio Grande River. This is well outside the floodplain for this drainage. However, a small portion of the off-base sewer line intersects the floodplain but is compatible with this feature since the sewer line would be underground. Runoff and sediments carried by wind from sewer line construction sites would be controlled using best management practices (e.g., use of water, straw bales, or erosion fences). Therefore, the proposed action is not expected to result in significant negative impacts to water resources in the area.

Septic System Replacement

This project location is also over half a mile northwest of the primary surface channel, Tijeras Arroyo, and is well outside the floodplain for this drainage. Runoff from septic system construction sites would be controlled using erosion control technologies discussed under Geologic Resources (Section 4.5.2.1). Therefore, this alternative is not expected to have significant negative impacts on water resources in the area.

No-Action Alternative

Selection of the No-Action Alternative would result in the continued use of the septic system, which could result in the clogging of the leach field. If this occurs and cannot be cleared, the tanks will be downgraded to holding tanks and the

wastewater would be pumped out on a regular basis. No effect would occur to water resources from this alternative.

4.6.2.2 Firing Range Renovation

Proposed Action

This project location is located over half a mile northwest of the primary surface channel, Tijeras Arroyo, and is well outside the floodplain for this drainage. Runoff from construction sites would be controlled using best management practices (e.g., use of water, straw bales, or erosion fences). Therefore, the proposed renovation is not expected to result in significant negative impacts to water resources in the area.

Use of the M-60 Range On Base

This alternative would not have any effect on water resources because no water would be used for operational activities and no soil disturbing activities would occur if this action were implemented. Therefore, no negative impacts to water resources are expected from implementation of this alternative.

No-Action Alternative

Selection of the No-Action Alternative would result in no improvements to the storm runoff at the firing range facility, which could result in continued erosion or flooding in the area.

4.6.3 Other Future Actions on the Base

No impacts to floodplains would occur from implementation of the proposed action or other future actions on base. The other future proposed projects would also involve some construction, as would the proposed actions in this document. Runoff from construction sites would be controlled using best management practices (e.g., use of straw bales, or erosion fences). Therefore, the effects on water resources from the proposed actions described in this EA, when considered with potential water resources disturbance from the other four future

actions, are not expected to have any significant cumulative impacts on the area's water resources.

4.7 BIOLOGICAL RESOURCES

4.7.1 Significance Criteria

Criteria for determining the significance of impacts to biological resources are based on: (1) the importance (legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to proposed activities, and (4) the duration of ecological ramifications. An impact to biological resources would be considered significant if it would adversely affect species or habitats of high concern over relatively large areas, or reduce population size or distribution of a species of special concern.

Criteria for determining the significance of impacts to wetlands are based on: (1) the function and value of the wetland, (2) the proportion of the wetland that would be affected relative to the occurrence of similar wetlands in the region, (3) the sensitivity of the wetland to proposed activities, and (4) the duration of ecological ramifications. An impact to wetland resources would be considered significant if it would adversely affect a high-value wetland.

4.7.2 Impacts

Biologists familiar with the resources on the base were contacted to identify those species or habitats of potential concern from the proposed projects. Potential impacts to biological resources from implementation of the proposed action and alternatives were evaluated.

4.7.2.1 Sewer Line Project

Proposed Action

Vegetation that would be affected by implementation of the proposed action consists of weedy disturbed grassland species found along the proposed sewer

line route. Disturbance during construction would be minimized where possible. Soil erosion protection measures would be used to protect surrounding vegetation from erosional effects. Dust suppression would also be employed, adding the benefit of minimizing particulate coverage of the leaf surfaces. This corridor represents a very small portion of the grassland association on base and in the region, and development of this corridor would not affect the grassland association survivability at the local or regional levels. Areas disturbed would be landscaped or revegetated where feasible. Therefore, impacts to vegetation communities would be minor.

Direct impacts from the proposed action on wildlife populations would be negligible. Disturbance of grassland could temporarily displace mobile species, such as the burrowing owl, but this would not significantly increase the competition with the resident species in the surrounding grassland for available resources, such as food, shelter and nesting sites because of the small areas involved at any one time. Nonmobile species, such as rodents, could be killed by the trencher, but these losses would be small in number and would not significantly affect wildlife populations as a whole.

No wetland habitat exists near the proposed disturbance areas; the closest wetland is located uphill of the project locations, therefore impacts to wetlands are not expected to occur. No state or federally listed species or critical habitat have the potential to occur along the sewer line corridor and therefore would not be affected by the proposed action.

Septic System Replacement

This alternative could include the installation of new septic systems and leach fields. These locations have not been determined at this time. If this alternative is selected, biological surveys would be conducted to ensure sensitive species and habitats are avoided when possible. Impacts are expected to be similar to those described for the proposed action.

No-Action Alternative

Under the No-Action Alternative, existing conditions, as described in Section 3, would remain unchanged. The septic fields could become clogged and ineffective. This would prevent further filtering of the wastewater in the leach fields so less moisture would be available to the ecosystem. Since species in the area are adapted to arid environments and the moisture was underground and unavailable for wildlife use, this difference should not affect the ecosystems in the area.

4.7.2.2 Firing Range Renovation

Proposed Action

Vegetation associated with the proposed action includes cantonment area landscaping surrounding the facilities, and disturbed grassland surrounding the firing range. Disturbance at the site would be minimized where possible. Soil erosion protection measures would be used to protect surrounding vegetation from erosional effects. Dust suppression would also be employed, adding the benefit of minimizing particulate coverage of the leaf surfaces. This site represents a very small portion of the grassland association on base and in the region, and development of this site will not affect the grassland association survivability at the local or regional levels. Areas disturbed would be landscaped or revegetated where feasible. Therefore, impacts to vegetation communities would be minor.

Direct impacts from the proposed action on wildlife would be negligible. Disturbance of grassland could temporarily displace mobile species, such as the burrowing owl, but this would not significantly increase the competition with the resident species in the surrounding grassland for available resources, such as food, shelter and nesting sites because of the small areas involved at any one time.

No wetland habitat exists near the proposed disturbance areas; the closest wetland is located uphill of the project locations, therefore impacts to wetlands are not expected to occur. No state or federally listed species or critical habitat

have the potential to occur on the project site and would not be affected by the proposed action.

Use of the M-60 Range On Base

No significant increase in ground disturbance is expected to occur from the increased use of this range. Therefore, impacts to vegetation or erosional concerns would not occur. Use of a natural canyon for firing range practice could affect wildlife in the area. Individual animals could get caught in the crossfire and perish. Others may be disturbed by the noise. Grey vireos could be found in the vicinity, although site specific surveys have not been conducted to verify if they are present in potential habitat that occurs on site. Many sensitive raptors, including the federally listed as threatened bald eagle, can be found in the withdrawn area of the base and may be disturbed by the noise. The state listed as threatened white-eared hummingbird has the potential to occur in the downrange area, but it is a transient and is unlikely to be affected due to the short duration of occurrence on base and the intermittent nature of firing range use. Overall, since the range is currently being used as a machine gun range, species sensitive to human presence and the noise of gunfire would have probably already moved farther from the site. Therefore, the impacts to biological resources from this alternative are expected to be minimal.

No-Action Alternative

Under the No-Action Alternative, existing conditions, as described in Section 3, would remain unchanged.

4.7.3 Other Future Actions on the Base

Minimal negative impacts to biological resources would occur from the proposed actions and from other currently known future actions when considered cumulatively. The proposed prairie dog relocation would ultimately benefit prairie dog populations on the base by allowing them to expand in an area compatible with their occupation. The removal of prairie dogs from exclusion areas could affect a small number of non-target animals living in the area but would not affect the populations as a whole. The fire training facility

and the sewer line would disturb degraded grassland areas (permanently and temporarily, respectively). However, these types of grasslands are plentiful in the area and would not be regionally affected by these relatively small effects. All other projects are in developed areas and would not affect biological resources. Therefore, the cumulative effects of the proposed actions, when considered with potential biological resources disturbances from other currently proposed actions, are not expected to have a significant cumulative impact on biological resources in the area.

4.8 TRANSPORTATION AND CIRCULATION

4.8.1 Significance Criteria

Impacts to transportation and circulation are assessed by determining an action's potential to affect current transportation patterns, systems, service, and/or safety. Impacts may arise from physical changes to circulation (e.g., closing, rerouting, or creating roads), construction activity (e.g., introduction of construction-related traffic on local roads), or changes in daily or peak-hour traffic volumes created by workforce and population changes related to installation activities. An impact on roadway capacities would be considered significant if a road with no history of capacity exceedances was forced to operate at or above its design capacity. An impact is also considered significant if the action would increase traffic on roads already experiencing traffic problems.

4.8.2 Impacts

Potential impacts to transportation and circulation are typically analyzed by: (1) identifying and describing transportation and circulation that could affect or be affected by the project, (2) examining the effect this action may have on the resource, (3) assessing the significance of potential impacts, and (4) providing measures to mitigate potentially significant impacts.

4.8.2.1 Sewer Line Project

Proposed Action

Septic system removal and sewer installation activities would result in some increased construction worker and material-hauling vehicle trips in scattered areas throughout the base; however, these minor increases would be temporary in nature. The number of facility personnel, under the proposed action, is not anticipated to increase. The proposed action would not change the long-term traffic flows on the base or in the region.

Installation of sewer lines would occur along existing roads but most of the construction activities will be conducted in the road shoulder and should not hinder traffic during sewer line installation. Under the proposed action, no short- or long-term adverse impacts to transportation and circulation patterns on and off base are anticipated.

Septic System Replacement

Septic system removal and replacement activities would result in some increased construction worker and material-hauling vehicle trips in the 600 and 700 areas of the base; however, these minor increases would be temporary in nature. Implementation of this alternative would not change the long-term traffic flows on the base or in the region.

No-Action Alternative

The No-Action Alternative would result in a minimal change to current conditions of transportation and circulation on Kirtland AFB and the region. If the leach fields become clogged and the tanks are downgraded to holding tanks, the tanks will have to be pumped out on a regular basis. This activity should not affect the traffic flows on the base since it would require one trip per month by one pumper truck.

4.8.2.2 Firing Range Renovation

Proposed Action

Renovation activities would result in some increased construction worker and material-hauling vehicle trips throughout the base; however, these minor increases would be temporary in nature. The number of facility personnel, under the proposed action, is not anticipated to increase.

Use of the M-60 Range On Base

The use of the M-60 Range would require the firing range trainees to be bussed in from a common parking lot, assumed to be the small arms and rifle range for this analysis. One round trip every day during the week is anticipated. This would add one vehicle to Southgate Avenue, Hardin Boulevard, Pennsylvania Street, Lovelace Road, Mortar Range Road, and Mount Washington Road per day. One vehicle per day would not affect transportation patterns on the base or in the region.

No-Action Alternative

The No-Action Alternative would result in no change to current conditions of transportation and circulation at most of Kirtland AFB and the region since the proposed action would not take place. Traffic to the small arms and rifle range would decrease when the firing range closed.

4.8.3 Other Future Actions on the Base

Construction, renovation, and demolition activities from all other currently proposed actions (except the prairie dog relocation) would result in increased construction worker and material-hauling vehicle trips in scattered regions throughout the base; however, these minor increases would be temporary in nature. The number of facility personnel, for all actions, is not anticipated to increase significantly for operation of any facility being constructed or renovated. None of these actions would change the long-term traffic flows on the base or in the region. Therefore, minor, short-term impacts to traffic

resulting from the proposed actions, when combined with potential impacts to transportation resources from the other currently proposed actions, are not expected to significantly impact the area's transportation or circulation.

4.9 VISUAL RESOURCES

4.9.1 Significance Criteria

Criteria for determining the significance of impacts to visual resources are based on the level of visual sensitivity of an area. Visual sensitivity is defined as the degree of public interest in a visual resource and concern over adverse changes in the quality of that resource. In general, an impact on a visual resource is considered significant if implementation of an action would substantially alter a sensitive visual setting.

4.9.2 Impacts

After assessing the visual character and relative sensitivity of the affected setting, changes to the landscape associated with the proposed actions and alternatives were compared in terms of their potential to noticeably alter existing viewsheds.

4.9.2.1 Sewer Line Project

Proposed Action

The proposed sewer line would be installed underground, and the septic systems, if removed, would be filled in and reseeded, blending the disturbed sites with the surrounding landscape. Since this action would not change the current visual conditions present at the project location, no adverse impacts to visual resources would occur.

Septic System Replacement

The area disturbed by the septic systems replacement and removal would be recontoured to blend with the surrounding area and reseeded. Since this action

would not change the current visual conditions present at the project location, no adverse impacts to visual resources would occur.

No-Action Alternative

The No-Action Alternative would result in no change to current visual conditions at Kirtland AFB and the region.

4.9.2.2 Firing Range Renovation

Proposed Action

Facility modifications that would occur with implementation of the proposed action would be minor, or would consists of replacement of the existing structures and would occur in an area currently developed with similar types of structures. Since this action would not change the current visual conditions present at the project location, no adverse impacts to visual resources would occur.

Use of the M-60 Range On Base

No facility modifications are required for the use of the M-60 Range for small arms and rifle training. Since this action would not change the current visual conditions present at the project location, no adverse impacts to visual resources would occur.

No Action Alternative

The No-Action Alternative would result in no change to current visual conditions at Kirtland AFB and the region.

4.9.3 Other Future Actions on the Base

Facility modifications and construction associated with the proposed actions and the other currently proposed actions would be minor and would occur in areas currently developed with similar types of structures. Since the actions would

not change the current visual conditions present at the project locations, no adverse cumulative impacts to visual resources would occur.

4.10 CULTURAL RESOURCES

4.10.1 Significance Criteria

The National Historic Preservation Act of 1966, as amended, establishes the National Register of Historic Places and Title 36 CFR § 60.4 defines the criteria used to establish significance and eligibility to the National Register as follows:

> "The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and,
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) That have yielded, or may be likely to yield, information important in prehistory or history.

4.10.2 Impacts

Analysis of potential impacts to significant cultural resources considers both direct and indirect impacts. Impacts may occur by: (1) physically altering, damaging, or destroying all or part of a resource, (2) altering the characteristics of the surrounding environment that contribute to resource significance, (3)

introducing visual, audible, or atmospheric elements that are out of character with the property or alter its setting, or (4) neglecting the resource to the extent that it is deteriorated or destroyed. Impacts are assessed by identifying the types and locations of proposed actions and determining the exact locations of cultural resources that could be affected.

4.10.2.1 Sewer Line Project

Proposed Action

No significant historic or prehistoric cultural resources exist within the on-base sewer line route. As a result, no impacts are anticipated to occur to known cultural resources from implementation of the proposed action.

There is, however, a low, sandy rise located south of Southgate Avenue and east of Cell Drive. This rise is relatively undisturbed and there is a potential for buried cultural resources in the area. It is recommended that subsurface disturbance in this area be monitored by a qualified archaeologist. If buried cultural deposits are encountered, trenching/excavation activities should be diverted until the deposit can be evaluated.

On lands owned by the city of Albuquerque, several sites were discovered. Laboratory of Anthropology site 127814 (OEES-2) is within the proposed sewer line route and probably contains a thermal feature and buried artifacts. On the basis of its potential to yield additional information through dating techniques and the probably presence of buried artifacts, the site is considered eligible for inclusion in the National Register of Historic Places (NRHP) under criterion d (36 CFR § 60.4), information potential. If this site is impacted, further recovery of these resources would be required.

The septic systems in these areas consist of standard design for all septic systems. The tanks and concrete overlays are standard and have no historical significance. There are no visual architectural features. The system is not eligible for the NRHP.

Septic System Replacement

The septic systems in these areas consist of standard design of all septic systems. The tanks and concrete overlays are standard and have no historical significance. There are no visual architectural features. The system is not eligible for the NRHP.

The sites of any new septic system components have not been determined at this time. If this alternative is chosen, an archaeological reconnaissance would be conducted to determine if any cultural resources are present in these areas.

No Action Alternative

If the No-action Alternative were to be selected, cultural resources would be unaffected.

4.10.2.2 Firing Range Renovation

Proposed Action

No significant historic or prehistoric cultural resources exist within the current project boundaries. As a result, no impacts are anticipated to occur to known cultural resources from implementation of the proposed action.

Use of the M-60 Range On Base

No facility or ground disturbance is anticipated for the implementation of this alternative. Therefore, no impacts are anticipated to occur to known cultural resources from implementation of this alternative.

No Action Alternative

If the No-Action Alternative were to be selected, cultural resources would be unaffected.

4.10.3 Other Future Actions on the Base

No significant historic or prehistoric cultural resources are known to be potentially affected by the proposed actions or from other currently known future actions. It is recommended that subsurface disturbance in any area designated as potentially sensitive should be monitored by a qualified archaeologist. If buried cultural deposits are encountered trenching/excavation activities would have to be diverted until the deposit could be evaluated. If these precautions are taken during implementation of the proposed actions and the other currently proposed future actions, the actions are not expected to have a significant cumulative impact on cultural resources in the area.

4.11 SOCIOECONOMICS

4.11.1 Significance Criteria

Impacts of population and expenditure are assessed by determining an action's direct effect on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly depending on the location of a proposed action; for example, the termination of an operation that employs 25 people in a major metropolitan area may be virtually unnoticed while the same action would have significant adverse impacts in a small community. A socioeconomic impact would be considered significant if implementation of an action would substantially shift population trends, or adversely affect regional spending patterns.

An impact to Environmental Justice would be considered significant if an action would result in a disproportionate adverse impact to minority or low-income populations in the project vicinity.

4.11.2 Impacts

Potential impacts to socioeconomic resources were analyzed by: (1) identifying and describing socioeconomic resources that could affect or be affected by the project, (2) examining the effects this action may have on the resource, (3)

assessing the significance of potential impacts, and (4) providing measures to mitigate potentially significant impacts.

4.11.2.1 Sewer Line Project

Proposed Action

Socioeconomic impacts from implementation of the proposed action would be beneficial overall, but minor and short-term in nature. Purchase of construction materials and salaries paid to construction workers would constitute a minor, temporary, beneficial impact on the local economy. Contracts for construction equipment would also have a temporary, beneficial impact. In a metropolitan area the size of Albuquerque, these impacts would be negligible.

Given the short-term nature of the proposed action and the confinement of most of the activities to on-base sites (except for the short portion of the sewer line that would be in the road shoulder off base south of Ira Sprecher gate where no communities are located), no off-base communities would be affected by this action. Although the Albuquerque area has relatively high percentages of minority and low-income populations, these communities would not be disproportionately affected. Therefore, possible impact to populations identified in EO 12898 would be negligible.

Septic System Replacement

The socioeconomic impacts from implementation of this alternative would be overall beneficial, but minor and short-term. Purchase of construction materials and salaries paid to construction workers would constitute a minor, but temporary beneficial impact on the local economy. Contracts for construction equipment would also have a temporary beneficial impact. In a metropolitan area the size of Albuquerque, these impacts would be negligible.

No off-base communities would be affected by this action, therefore, no minority or low-income populations would be disproportionately affected.

No-Action Alternative

Selection of the No-Action Alternative would not result in any changes to socioeconomics or to the minority or low-income populations in the Albuquerque area.

4.11.2.2 Firing Range Renovation

Proposed Action

The socioeconomic impacts from implementation of the proposed action would be beneficial overall but minor and short-term in nature. Purchases of construction materials for renovation or construction, and salaries paid to construction workers would constitute a minor beneficial, but temporary impact on the local economy. Contracts for construction equipment would also have a temporary beneficial impact. In a metropolitan area the size of Albuquerque, these impacts would be negligible.

Given the short-term nature of this proposed action and the confinement of related activities to on-base sites, no off-base communities would be affected by the proposed actions. Although the Albuquerque area has relative high percentages of minority and low-income populations, these communities would not be disproportionately affected. Therefore, possible impact to populations identified in EO 12898 would be negligible.

Use of the M-60 Range On Base

No effect to socioeconomics or off-base communities would occur as a result of implementing this alternative.

No-Action Alternative

Selection of the No-Action Alternative would not result in any changes to socioeconomics or to the minority and low-income populations in the Albuquerque area.

4.11.3 Other Future Actions on the Base

The overall impacts on socioeconomics from the proposed actions described in this EA, and from other future actions currently being evaluated, would be beneficial in nature, but negligible. Minority and low-income populations off base would not be affected. Effects on socioeconomics from the proposed actions, when combined with the other future actions, are not expected to significantly impact the area's socioeconomic environment.

4.12 Environmental Management

4.12.1 Significance Criteria

Numerous local, state, and federal laws regulate the storage, handling, disposal, and transportation of hazardous materials and wastes; the primary purpose of these laws is to protect public health and the environment. Criteria for determining the significance of potential impacts associated with hazardous substances are based on toxicity, ignitability, and corrosivity. Generally, an impact associated with hazardous materials and wastes would be considered significant if implementation of an action would substantially increase human health risks or environmental exposure and these impacts could not be mitigated to acceptable federal, state, and local levels. A reduction in the quantity of hazardous substances used or generated could be a significant beneficial impact, whereas a substantial increase in the quantity and/or toxicity of hazardous substances used or generated could be a significant and adverse impact.

4.12.2 Impacts

Potential impacts to hazardous materials and wastes are typically analyzed by: (1) conducting a comparative analysis of existing and proposed hazardous materials and waste management practices to evaluate potential changes resulting from implementation of the proposed action and alternatives, (2) assessing the significance of potential impacts, and (3) providing measures to mitigate potentially significant impacts.

4.12.2.1 Sewer Line Project

Proposed Action

During construction of the sewer line, a short-term increase in nonhazardous and hazardous waste generation would occur. Nonhazardous construction wastes and demolition debris (e.g., concrete) would be transported to the Kirtland AFB landfill for disposal; this landfill has adequate capacity to accommodate the construction-related waste generated by the project. Additional nonhazardous waste generated by construction crews (e.g., plastics, paper, and food waste) would be collected in on-site dumpsters and transported to a permitted Subtitle D landfill. Recyclable wastes would be separated for pickup in accordance with the Kirtland AFB Qualified Recycling Program.

With the exception of fuel, oils and lubricants used by construction equipment, no potentially hazardous wastes would be generated by the proposed action.

Approximately 3,050 gallons of wastewater per day are expected to be added to the Albuquerque public treatment works if the proposed action were implemented under current staffing levels. If the 600 and 700 series facilities were all staffed to their maximum capacities, approximately 80,000 gallons of wastewater per day would be generated and added to Albuquerque's treatment plant. Although there are no plans to increase current staffing in these facilities, there is sufficient capacity at this facility to treat this increase (Reeder, 1999). Kirtland AFB will have to notify the city of Albuquerque's Wastewater Utilities Division the actual amount of the planned increase in order to modify Kirtland AFB's current wastewater permit.

No hazardous materials have been identified associated with the septic systems in the 600 and 700 areas. Nevertheless, these systems will be tested for hazardous materials prior to any work being done to remove or abandon them. Low priority Installation Restoration Program (IRP) designations have been given to these septic tanks because of past findings in some of the tanks, and they will be handled in accordance with all applicable regulations.

Because all hazardous wastes and IRP sites will be handled in accordance with the rules and regulations governing these concerns, no negative impact to their management would be associated with the proposed action. With the construction of the sewer line, these potential sources of contamination would be closed and the environment in the vicinity of the leach fields would be protected from potential contamination from laboratory wastes.

Septic System Replacement

All septic systems would be evaluated as to the extent necessary to replace the tanks and/or the leach fields. The option of removing the old septic system and replacing with new tanks in the same vicinity; or the option of abandoning the old system in place (following state guidelines to ensure proper closure of the tanks and the system) and replacing them in the same vicinity, would be selected depending on the environmental conditions that would best support the desired life span of the system. Therefore, the system as a whole would be improved.

No-Action Alternative

Selection of the No-Action Alternative could result in a septic leach field failure that would require that these septic tanks be downgraded to holding tank status. These tanks would have to be pumped on a regular basis and tracked by a log used in reporting compliance to the state environmental division. The state would have to inspect the cleaning of the tanks and the closing of the input and output pipes in order to reclassify these tanks from septic to holding tanks.

4.12.2.2 Firing Range Renovation

Proposed Action

During renovation of the firing range, a short-term increase in nonhazardous and hazardous waste generation would occur. Nonhazardous construction wastes and demolition debris (e.g., concrete and lumber) would be transported to the Kirtland AFB landfill for disposal; this landfill has adequate capacity to accommodate construction-related waste from the proposed action. Additional

nonhazardous waste generated by the construction crew (e.g., plastics, paper, and food waste) would be collected in on-site dumpsters and transported to a permitted Subtitle D landfill. Recyclable wastes would be separated for pickup in accordance with the Kirtland AFB Qualified Recycling Program.

Hazardous wastes may be generated by removal and disposal of the building materials known to contain asbestos and/or lead-based paint, by the removal and disposal of the lead-contaminated dust found within Building 707, and by the removal and disposal of the lead rounds that litter the firing range. The rounds would be exempt from the Resource, Conservation, and Recovery Act if sent to a qualified recycler.

Because hazardous wastes and IRP sites would be handled in accordance with the rules and regulations governing these concerns, no negative impacts to the management of this site or other IRP sites would result from the proposed action.

Use of the M-60 Range On Base

Increased use of the M-60 Range would increase the quantity of lead rounds on the range. This would require cleanup activities sometime in the future, although spent rounds are already present at the range. Therefore, the management of hazardous wastes and materials would not change from the current conditions.

No-Action Alternative

Selection of the No-Action Alternative would result in asbestos and lead-based paint materials remaining in facilities requiring renovations. The lead dust and rounds contamination at the firing range would continue to accumulate under the No-Action Alternative. The indoor firing range (Building 707) would continue to be unusable due to lead contamination. Lead rounds would build up in the open firing range backstop and render the range unsafe to use in approximately three years. This facility would have to shut down to firing range activities at that time and the site would be classified as an IRP site. Facility

closure would require that a project be initiated to clean up the lead contamination and to restore the site.

4.12.3 Other Future Actions on the Base

During construction and renovation, a short-term increase in nonhazardous and hazardous waste generation would occur for all future actions (except prairie dog relocation), as well as the proposed actions. Because all of the hazardous wastes and IRP sites would be handled in accordance with the rules and regulations governing these concerns, no negative impact to their management would be associated with the proposed actions. All nonhazardous wastes would be recycled or taken to permitted landfills for disposal. Therefore, the proposed actions, when considered with the other four future actions, are not expected to have a significant cumulative impact on environmental management concerns on the base.

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SECTION 7
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